

## ***European Aviation Safety Agency***

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**DECISION N° 2011/006/R**  
**OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY**  
**OF 19 AUGUST 2011**

**Amending Decision No. 2003/1/RM of the Executive Director of the Agency of 17 October 2003 on acceptable means of compliance and guidance material for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations ('AMC and GM to Part-21')**

***'Environmental protection – classification of changes to a type design'***

THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY,

Having regard to the 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<sup>1</sup> (hereinafter the 'Basic Regulation'), and in particular Articles 18(c), 19(b) and 38(3)(a) thereof,

Having regard to the 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<sup>2</sup>, and in particular 21A.18 of the Annex (Part-21) thereof,

Whereas:

- (1) The Commission has amended the Basic Regulation with Commission Regulation (EC) No 690/2009 of 30 July 2009<sup>3</sup> to include references to the latest amendments of Volumes I and II of Annex 16 to the Chicago Convention.

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<sup>1</sup> OJ L 79, 19.3.2008, p. 1. Regulation as last amended by Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 (OJ L 309, 24.11.2009, p. 51).

<sup>2</sup> OJ L 243, 27.9.2003, p. 6. Regulation as last amended by Regulation (EC) No 1194/2009 of 30 November 2009 (OJ L 321, 8.12.2009, p. 5).

<sup>3</sup> OJ L 199, 31.7.2009, p. 6.

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- (2) The Agency shall, pursuant to Article 18 of the Basic Regulation, issue certification specifications codes and acceptable means of compliance, as well as guidance material for the application of the Basic Regulation and its implementing rules.
- (3) Pursuant to Article 19 of the Basic Regulation, certification specifications, acceptable means of compliance and guidance material adopted by the Agency shall reflect the state of the art and the best practices in the fields concerned and be updated taking into account worldwide experience from in-service aircraft, as well as scientific and technical progress.
- (4) The Agency, pursuant to Article 52(1)(c) of the Basic Regulation and Articles 5 and 6 of the Rulemaking Procedure<sup>4</sup>, has widely consulted interested parties on the matters that are subject of this Decision and has provided thereafter a written response to the comments received<sup>5</sup>.

HAS DECIDED:

*Article 1*

Paragraph 8 'Environment' of Appendix A to GM 21A.91 'Examples of Major Changes per discipline' to Decision ED/2003/01/RM of the Executive Director of the Agency of 17 October 2003 is hereby amended as provided in the Annex to this Decision.

*Article 2*

This Decision shall enter into force on 26 August 2011. It shall be published in the Official Publication of the Agency.

Done in Cologne, on 19 August 2011.

P. GOUDOU

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<sup>4</sup> Management Board Decision concerning the procedure to be applied by the Agency for the issuing of Opinions, Certification Specifications and Guidance Material ('Rulemaking Procedure'), EASA MB 08-2007, 13.6.2007.

<sup>5</sup> See the Notice of Proposed Amendment (NPA) No 2010-13 and the Comment Response Document (CRD) to NPA 2010-13 both documents are available under [http://www.easa.europa.eu/ws\\_prod/r/r\\_archives.php](http://www.easa.europa.eu/ws_prod/r/r_archives.php).

## Annex to ED Decision 2011/xxx/R

Paragraph 8 'Environment' of Appendix A to GM 21A.91 'Examples of Major Changes per discipline' to Decision ED/2003/01/RM of the Executive Director of the Agency of 17 October 2003 on acceptable means of compliance and guidance material for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations ('AMC and GM to Part-21') is hereby amended as shown below.

The text of amendments is arranged to show deleted text or new text as follows:

1. Text to be deleted is shown with a ~~line through it~~.
2. New text to be inserted is highlighted with **grey shading**.
3. '...' indicates that remaining text is unchanged in front of or following the reflected amendment.

**RESULTING TEXT:****AMC and GM to Part-21**

...

Appendix A to GM 21A.91: Examples of Major Changes per discipline

...

**8 Environment**

~~A change that introduces an increase in noise or emissions.~~

The introductory text to Appendix A to GM 21A.91 describes how in Part-21 a negative definition is given of minor changes only. This philosophy is similar to the manner in which the ICAO Standards and Recommended Practices for environmental protection (ICAO Annex 16) and the associated Guidance Material (ICAO Environmental Technical Manual) define changes affecting a product's environmental characteristics in terms of "no-acoustical changes" and "no-emissions changes" (i.e. changes which do not appreciably affect the product's environmental characteristics).

Following the general philosophy of this Appendix, however, it is preferred to give examples of changes which might have an appreciable effect on a product's environmental characteristics (i.e. the effect might be greater than the no-acoustic change and no-emissions change criteria) and might therefore lead to a major change classification.

Where a change is made to an aircraft or aircraft engine, the effect of the change on the product's environmental characteristics should be taken into account. Examples of changes that might have an appreciable effect on the product's environmental characteristics, and might therefore be classified as a major change, are listed below. The examples are not exhaustive and will not, in every case, result in an appreciable change to the product's environmental characteristics, and therefore, will not per-se and in every case result in a major change classification.

An appreciable effect is considered to be one which exceeds the ICAO criteria for a no-acoustical change or a no-emissions change. For the definition of a no-acoustical change refer to the section of the ICAO Environmental Technical Manual, Volume I (ICAO Doc 9501, Volume I – Procedures for the Noise Certification of Aircraft) concerning changes to aircraft type designs involving no-acoustical changes (see also the definitions of a 'derived version' in ICAO Annex 16, Volume I). For the definition of a no-emissions change refer to the section of the ICAO Environmental Technical Manual, Volume II (ICAO Doc 9501, Volume II – Procedures for the Emissions Certification of Aircraft Engines) concerning no-emissions changes.

- (i) Noise: A change that introduces either:
- an increase in the noise certification level(s); or
  - a reduction in the noise certification level(s) for which the applicant wishes to take credit.

Examples of noise-related changes that might lead to a major change classification are:

- (1) For jet and heavy (maximum take-off mass greater than 8618 kg) propeller-driven aeroplanes:
- A change that might affect the aircraft's take-off performance including:
    - a change to the maximum take-off mass;
    - a change to  $V_2$  ("take-off safety speed"); or
    - a change to the lift augmentation devices, including their configuration under normal take-off operating conditions.
  - A change that might affect the aircraft's landing performance including:
    - a change to the maximum landing mass;
    - a change to  $V_{REF}$  (reference landing speed); or
    - a change to the lift augmentation devices, including their deployment under normal landing operating conditions.
  - A change to the Centre of Gravity (CG) limits;
  - A change that increases the aircraft's drag;
  - A change that alters the external profile of the aircraft, including the installation or change of shape or size of any item on the external surface of the aircraft that might protrude into the airflow such as winglets and vortex generators; generally the installation of small antennas does not represent an acoustical change;
  - A change that introduces an open-ended hollow cavity at more or less right angles to the airflow (e.g. hollow pins in undercarriage assemblies);
  - A change of engine or, if fitted, propeller type;
  - A change in engine thrust rating;
  - A change to the engine rotating parts or stators, such as geometry, blade profile or blade number;
  - A change to the aerodynamic flow lines through the engine;
  - A change that affects the engine thermodynamic cycle, including a change to the engine's bypass ratio;
  - A change to the engine nacelle, including a change to the acoustic liners;
  - A change to the engine exhaust;
  - A change to the engine bleed valves, including bleed valve scheduling;

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- A change in the operation of engine power off-takes (e.g. the operation of the Environmental Control System (ECS) during a normal take-off or approach);
- A change to the Auxiliary Power Unit (APU), including associated operating limitations (e.g. a change that allows the APU to be operated during a normal approach when previously it was not allowed);
- A change to the propeller pitch and/or propeller speed during a normal take-off or approach;
- A change that causes a change to the angle at which air flows into the propeller.

(2) For light (maximum take-off mass 8618 kg or less) propeller-driven aeroplanes:

- A change that might affect the aircraft's take-off performance including:
  - a change to the maximum take-off mass;
  - a change to the take-off distance;
  - a change to the rate of climb; or
  - a change to  $V_Y$  (best rate of climb speed).
- A change that increases the aircraft's drag (e.g. the installation of external cargo pods, external fuel tanks, larger tyres to a fixed undercarriage, floats etc.);
- A change of engine or propeller type;
- A change in take-off power including a change in engine speed (tachometer "red line") or, for piston engines, a change to the manifold pressure limitations;
- A change to the highest power in the normal operating range ("top of green arc");
- In the case of an aircraft where take-off power/engine speed is time limited, a change in the period over which take-off power/engine speed may be applied;
- A change to the engine inlet or exhaust including, if fitted, the inlet or exhaust muffler;
- A change in propeller diameter, tip shape, blade thickness or the number of blades;
- The installation of a variable or adjustable pitch propeller in place of a fixed pitch propeller and vice versa;
- A change that causes a change to the angle at which air flows into the propeller.

(3) For helicopters:

- A change that might affect the take-off and/or landing performance, including a change in take-off mass and  $V_Y$  (best rate of climb speed);
- A change to  $V_{NE}$  (never-exceed airspeed) or to  $V_H$  (airspeed in level flight obtained using the torque corresponding to minimum engine installed, maximum continuous power available for sea level pressure, 25°C ambient conditions at the relevant maximum certificated mass);
- A change to the maximum take-off engine power or maximum continuous power;
- A change to the gearbox torque limits;
- A change of engine type;
- A change to the engine intake or exhaust;
- A change to the maximum normal operating rpm of the main or tail rotors;

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- A change to the main or tail rotors, including a change in diameter, blade thickness or blade tip profile.

Note: The effect on the helicopter's noise characteristics of either carrying external loads or the installation of external equipment need not be considered.

(ii) Emissions: A change that introduces an increase or decrease in the emissions certification levels. Examples of smoke and gaseous engine emission-related changes that might lead to a major change classification are:

- A change in engine thrust rating;
- A change to the aerodynamic flow lines through the engine;
- A change that affects the engine thermodynamic cycle, specifically relevant engine cycle parameters (e.g. combustor pressure P3, combustor entry temperature T3, Air Fuel Ratio (AFR));
- A change to the compressor that might influence the combustor inlet conditions and engine overall pressure ratio;
- A change to the combustor design (geometry);
- A change to the cooling of the combustor;
- A change to the air mass flow through the combustor;
- A change that affects the fuel spray characteristics.