


EASA	AIRWORTHINESS DIRECTIVE
	<p>AD No.: 2008-0007R3</p> <p>Date: 12 May 2010</p> <p>Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EC) No 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.</p>
<p>This AD is issued in accordance with EC 1702/2003, Part 21A.3B. In accordance with EC 2042/2003 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [EC 2042/2003 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [EC 216/2008, Article 14(4) exemption].</p>	
<p>Type Approval Holder's Name :</p> <p>EUROCOPTER</p>	<p>Type/Model designation(s) :</p> <p>EC 225 LP helicopters</p>
<p>TCDS Number : EASA.R.002</p>	
<p>Foreign AD : Not applicable</p>	
<p>Revision : This AD revises EASA AD 2008-0007R2 dated 17 December 2008</p>	
ATA 04, 63	Limitations – 14Hz Vibrations at Low Density Altitude
<p>Manufacturer(s):</p>	<p>EUROCOPTER</p>
<p>Applicability:</p>	<p>EC 225 LP helicopters, all serial numbers, if:</p> <ul style="list-style-type: none"> - not equipped of all three modifications MOD 0726582, MOD 0726477 and MOD 0726583, or, - if not equipped of MOD 0726592, or, - if equipped with all three modifications MOD 0726606, MOD 0726610, MOD 0726611 and missing accomplishment of MOD 0726632. <p>Note 1: Above referenced MODs are modifications accomplished during production. In order to determine in-service accomplishment Service Bulletins of these modifications, refer to EUROCOPTER EC 225 Alert Service Bulletin No. 04A001 revision 3.</p>
<p>Reason:</p>	<p>Due to the main rotor control linkage design, there is a coupling between the Main Gearbox (MGB) motion and the main servo-control inputs. In certain flight conditions with increased air density, this generates spurious 14Hz control inputs in the main rotor which, in return, transfers dynamic loads to the structure, with feedback on the MGB motion, inducing a continuous vibration phenomenon. Flight tests have shown that there is a density altitude (H_σ) limit below which the occurrence of the vibration phenomenon is significantly increased or even diverges, which could lead to the loss of control of the helicopter. Pending availability of the Rotorcraft Flight Manuals' (RFM) revisions, EASA issued Emergency AD 2006-0056-E to require limiting the flight envelope, mitigating the risk of recurrence of the vibration phenomenon.</p>

Subsequently, EUROCOPTER developed modification (MOD) 0726532 relating to VMS software, MOD 0726477 relating to servo-controls with attenuated dynamic response and MOD 0726536 relating to FADEC software. Embodiment of these three modifications aimed to relieve the affected helicopters of the required flight envelope limitations. AD 2006-0056 Revision 1 was therefore issued to update the "Applicability" paragraph with information that when MOD 0726532, MOD 0726477 and MOD 0726536 were all installed together, this was considered as an optional terminating action, allowing the flight envelope limitations to be removed. In addition, AD 2006-0056 R1 took into account the availability of RFM revisions containing the required altitude limitations in order to relieve the need of maintaining a copy of this AD in the RFM.

Later on, flight test campaign and analysis showed that even with the 3 referenced MODs installed, the spurious 14Hz vibration phenomenon may not be totally precluded from the re-established flight envelope for certain flight conditions. Therefore, VMS and FADEC software versions have been upgraded, redefining the optional terminating action so that respectively, MOD 0726532 has been replaced with MOD 0726582 (VMS software version V11.01) and MOD 0726536 has been replaced with MOD 0726583 (FADEC software version V2.4.5) and the RFM revisions mentioned before have been amended accordingly.

For the reasons described above, AD 2008-0007 was issued to retain the requirements of AD 2006-0056 R1 which was superseded, imposing limitations on the flight envelope as originally specified, and redefining the optional terminating action that allowed operators to become relieved from the limitation to operate below -2 000 feet H_σ, by accomplishing MOD 0726582, MOD 0726477 and MOD 0726583 (modifications which permit to operate up to the certification H_σ of -3.500 feet), and by requiring the implementation of updated versions of the RFM Conditional Revisions RCe relevant to these 3 modifications.

Revision 1 of this AD was issued to take into account the certification of a flight envelope expansion that occurred in the meantime and which has resulted in a new definition of the limitations imposed by paragraph (1) of this AD. In addition, it aimed to correct incomplete references to RFM Conditional Revisions RCe in paragraph (3) of this AD and to add paragraph (4) to clarify the optional terminating action for the requirements of this AD.

Revision 2 of this AD was issued to correct the text of the limitation (density altitude instead of pressure altitude) in paragraph (1) so that it remained consistent with the title of the AD and with RFM revisions contents.

Thereafter, EUROCOPTER has on one hand designed MOD 0726592 (new MAKILA 2A1 engines, including MOD 0726583 and requiring MOD 0726582 and MOD 0726477) and on the other hand continued its development work for expansion of the flight envelope towards a lower H_σ. The last led to the approval of several new modifications allowing the expansion the flight envelope up to - 6,000 feet H_σ with no risk that the vibration phenomenon occurs.

The - 6,000 feet H_σ is possible when the helicopter is modified with the MOD 0726632 (-6,000 feet H_σ flight envelope) which encompasses a batch of associated modifications: previous MOD 0726477 (attenuated servo-controls) and new MOD 0726610 (FADEC software update, version V12), MOD 0726611 (VMS software update, version V2.4.6), MOD 0726606 (Autopilot software version S9.51) and also complementary MOD 0726631 (relevant wiring provisions).

Revision 3 of this AD is now issued :

- to take into account the approval of these new modifications (that are an alternative optional terminating actions for the requirements of this AD),
- to inform which helicopters remain subject to the limit of operation at -2,000 feet H_σ, and,

	<ul style="list-style-type: none"> - to require the RFM update with appropriate RFM revisions that results of latest modifications approval.
Effective Date:	26 May 2010.
Required Action(s) and Compliance Time(s):	<p>Required as indicated, unless accomplished previously:</p> <p>(1) On each flight as from March 01, 2006 [the effective date of Emergency AD 2006-0056-E], comply with the flight envelope limitation specified below:</p> <p>Operation below -2 000 feet (-610 m) density altitude (H_{σ}) is PROHIBITED.</p> <p>(2) Within 30 days after the effective date of this AD, ensure that the Rotorcraft Flight Manual is updated with the following revisions, as applicable:</p> <ul style="list-style-type: none"> - For standard EC 225 LP helicopters (equipped with air intakes fitted with screens): Normal Revision RN11 (10-04) in combination with Conditional Revision RCe (10-04), <p>or</p> <ul style="list-style-type: none"> - For EC 225 LP helicopters equipped with MPAI (multi purpose air intakes): Normal Revision RN21 (10-05) in combination with Conditional Revision RCe (10-04). <p>(3) At the operator's discretion, accomplishment on any helicopter of either all three modifications MOD 0726582, MOD 0726477, MOD 0726583, or the MOD 0726592, or all three modifications MOD 0726606, MOD 0726610, MOD 0726611 in conjunction of MOD 0726632, the limitation and RFM Conditional revisions imposed by paragraphs (1) and (2) of this AD are no longer required for that helicopter.</p> <p>Note 2:</p> <p>MOD 0726592 (MAKILA 2A1 engines) includes MOD 0726583 (FADEC software V11.01) and requires also MOD 0726582 (VMS software V2.4.5) and MOD 0726477 (servo-controls with attenuated dynamic response).</p> <p>Note 3:</p> <p>MOD 0726610 (FADEC software update, version V12) and MOD 0726611 (VMS software update, version V2.4.6) replace MOD 0726583 and MOD 0726582 respectively. The two new modifications MOD 0726610, MOD 0726611 must always be accomplished together and also jointly with MOD 0726606 (Autopilot software version S9.51).</p> <p>Note 4:</p> <p>MOD 0726632 ($H_{\sigma} = -6,000$ feet flight envelope) requires all three modifications MOD 0726610, MOD 0726611, MOD 0726606 have been accomplished and imposes also the MOD 0726477 and complementary MOD 0726631 (wiring provisions for low H_{σ} flight envelope).</p>
Ref. Publications:	<p>EUROCOPTER EC 225 Alert Service Bulletin No. 04A001 revision 3.</p> <p>Normal Revision RN11 (10-04) / Conditional Revision RCe (10-04).</p>

	<p>Normal Revision RN21 (10-05) / Conditional Revision RCe (10-04).</p> <p>The use of later approved revisions of these documents is acceptable for compliance with the requirements of this AD.</p>
Remarks :	<ol style="list-style-type: none">1. If requested and appropriately substantiated, EASA can approve Alternative Methods of Compliance for this AD.2. The original issue of this AD was posted on 13 December 2007 as PAD 07-223 for consultation until 27 December 2007. No comments were received during the consultation period.3. Enquiries regarding this AD should be referred to the Airworthiness Directives, Safety Management & Research Section, Certification Directorate, EASA. E-mail ADs@easa.europa.eu4. For any question concerning the technical content of the requirements in this AD, please contact: EUROCOPTER (STD1) - Aéroport de Marseille Provence - 13725 Marignane Cedex – France; Telephone: +33 (0) 4 42 85 97 97; Fax: 33 (0) 4 42 85 99 66. E-mail: Directive.technical-support@eurocopter.com