



AS 350 Teflon/Stainless Steel
Hydraulic Flight Control Hose Failures

AWB 29-004 Issue : 2
Date : 22 January 2014

1. Effectivity

All AS350 and AS355 and AS3555 helicopters incorporating MOD 074239 introducing Teflon/Stainless Steel hydraulic flight control hoses as detailed by helicopter model and part number applicability per Eurocopter Information Notice 2506-I-29.

2. Purpose

Alert operators, pilots and maintenance personnel regarding failures in new Teflon/stainless steel braided hydraulic hoses introduced by MOD 074239.

3. Background

CASA continues to receive defect reports describing the failure of new Eurocopter Teflon/stainless steel braided flight control hydraulic hoses, including more than one instance where new stainless steel / Teflon hoses have failed in succession on the one helicopter. In one case a Teflon/stainless steel hose developed undetected leak rate which was high enough to deplete the hydraulic reservoir from "MAX" to "MIN" in a single ferry flight lasting approximately 3.0 flight hours.

The flight control system typically requires six hydraulic hoses. Had more than one Teflon/stainless steel hose failed during that flight, it is very likely that not only would the hydraulic reservoir been more rapidly depleted, resulting in the flight controls reverting to manual and immediate forced landing, but fire in the air due to the presence of hydraulic oil in the main rotor gearbox compartment as described in *EASA AD 2011-0033 AS350 'Forward Hydraulic Servo Control Hoses'*. This AD requires the installation of fire sleeving on two (polyamide) hydraulic flight control hoses because:

"An in-flight fire in the main gearbox compartment occurred on an AS350B2 helicopter. The fire was caused by ignition of hydraulic fluid leaking from a hydraulic hose, which had been damaged following an electrical fault in a circuit located in the compartment that is not fire protected. An in-flight fire in the main gearbox compartment during a continued flight, when undetected or if a landing could not be performed immediately, can result in loss of hydraulics, possible shut down of the engine because of fire effects and damage to the Main Rotor (MR) control system. This condition, if not prevented, could lead to loss of MR control, potential power loss, structural damage and propagation of fire into the cabin or other compartments, consequently with loss of control of the helicopter and possible injury of the occupants. For the reasons described above, this AD requires installation of protection sleeves on hydraulic hoses as a final solution".



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Eurocopter Information Notice 2506-I-29, advises that the Teflon/stainless steel hydraulic hoses began leaking immediately followed their introduction. Their investigation found that the Teflon lining in these hoses can charge with static electricity via a tribo-electrical phenomenon (friction between the Teflon and the hydraulic oil flowing through it), creating a significant electrical potential which discharges into the stainless steel braid when its potential has reached the Teflon tube's insulating limit. This discharge (arcing) can create a micro perforation of the hose and cause leaks.

Eurocopter are unable to determine if any newly manufactured Teflon/stainless steel flight control hose will not develop leaks following installation. Eurocopter currently supply the Teflon /stainless steel hoses as replacements for hoses of the same part number which have failed in service. Failing Teflon /stainless steel hoses have now been discovered in newly manufactured AS350 helicopters.

4. Recommendations

CASA recommends that Operators:

- (1) Do not install the Eurocopter Teflon/stainless steel hoses (MOD 074239); and
- (2) Ensure all pilots and maintenance personnel closely monitor installed Teflon/stainless steel hoses for leaks; and
- (3) Plan to remove the Teflon/stainless steel hoses from service, and install POST MOD 074686 hoses at their earliest convenience.

5. Reporting

All reports of leaking AS350 Series flight control hoses should be reported to CASA via the SDR system, or email to SDR@casa.gov.au

6. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link e-mail address:

AirworthinessBulletin@casa.gov.au

or in writing, to:

Airworthiness and Engineering Standards Branch
Standards Division
Civil Aviation Safety Authority
GPO Box 2005, Canberra, ACT, 2601