

EASA	CERTIFICATION MEMORANDUM
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Subject

Rotorcraft - Oil Low Pressure Warning

Log of Issues

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1. INTRODUCTION

1.1. PURPOSE AND SCOPE

The purpose of **this** Certification Memorandum is to provide additional guidance for the oil low pressure warning required per CS 29.1305 (b)(1) for CS-29/CS-27 Category A rotorcraft.

1.2. REFERENCES

It is intended that the following reference materials be used in conjunction with this Certification Memorandum:

Reference	Title	Code	Issue	Date
CS 29.1305 (b)(1)	Certification Specifications for Large Rotorcraft	CS-29	2	17Nov2008
CS 29.1305 (b)(1)	Certification Specifications for Large Rotorcraft	CS-29	1	30Nov2007
CS 29.1305 (b)(1)	Certification Specifications for Large Rotorcraft	CS-29	Initial	14Nov2003
FAR 23.1305(l) and (m)	Federal Aviation Regulations	FAR 29	Amdt 29-0	01Feb1965
CAR 7.604(h)	Civil Air Regulation	CAR 7	-	01Aug1956
CAR 4b.604(h)	Civil Air Regulation	CAR 4b	-	31Dec1953
CAR 4b.604(k) and (l)	Amendment Civil Air Regulation	CAR 4b-6	-	08Jul1956

1.3. ABBREVIATIONS

The following abbreviations are used in this Certification Memorandum:

Abbreviation	Meaning
BCAR	British Civil Aviation Requirement
CAR	Civil Air Regulation
CM	Certification Memorandum
CS	Certification Specification
EASA	European Aviation Safety Agency
FAA	Federal Aviation Administration
FAR	Federal Aviation Requirement
IFSD	In-Flight Shutdown

Abbreviation	Meaning
JAR	J oint A viation R equirement
NPRM	N otice of P roposed R ulemaking (FAA)
TCCA	T ransport C anada C ivil A viation

1.4. DEFINITIONS

The following definitions are used in this Certification Memorandum:

Definition	Meaning
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2. BACKGROUND

Per reference 1, CS 29.1305(b)(1) reads:

"CS 29.1305 Power plant instruments

(b) For Category A rotorcraft:

(1) An individual oil pressure indicator for each engine, and either an independent warning device for each engine or a master warning device for the engines with means for isolating the individual warning circuit from the master warning device;"

This specific requirement was thoroughly discussed during several projects. The issue lies with two different readings of the rule:

- Interpretation 1 relates to the independence of cockpit information:
 - One warning indication for each engine; or
 - A master warning plus one other information to show the concerned engine.
 It does not imply any engine specific sensor. For example, the oil pressure sensor (engine part) can also be used as a warning device once the pressure falls below predefined thresholds.
- Interpretation 2 of this paragraph is at engine level, up to the cockpit indication. It would imply that there should be on each engine an oil pressure sensor independent from the oil pressure warning sensor. The low pressure warning is thereby independent from the pressure indication. This implies the addition of a second transducer on the engine, and the independence should be maintained up to the cockpit warning system.

2.1. CURRENT CS-29 RULES INTERPRETATION

A review was launched. Foreign authorities were contacted (FAA, TCCA) and compliance of past projects were reviewed. It appears that interpretations 1 and 2 have been inconsistently used in the past.

2.2. DISCUSSION

In order to consider the most appropriate interpretation of the requirement, evolutions for both the rotorcraft requirements and the large transport airplanes requirements are presented here below.

2.2.1. Rotorcraft requirements (ref. 1 to 7)

This requirement appears in the first issue of Civil Air Regulations (CAR) Part 7, Rotorcraft Airworthiness; Transport Categories, effective August 1, 1956 under § 7.604(h):

"(h) Category A: An individual oil pressure indicator for each engine and either an independent warning device for each engine or a master warning device for all engines with means for isolating the individual warning circuit from the master warning device."

The only difference in this text with the current rule has been underlined. CAR 6, the older regulation applicable to all rotorcraft in the US, did not feature such a rule.

In amendment 1 of FAR 29 published on 13 October 1964, FAR 29.1305(b)(1) reads:

"(b) For category A rotorcraft:

(1) An individual oil pressure indicator for each engine, and either an independent warning device for each engine or a master warning device for the engines with means for isolating the individual warning circuit form the master warning device;"

Interestingly, the associated justification for this rule (NPRM 64-30) features in the proposed FAR 29.675(b)(1) the CAR 7.604(h) text, with 'all engines'. NPRM 64-30 also states that the intention was to recodify CAR 7 rules into FAR 29, without changing the rule.

It can therefore be concluded that the rule exists since 1956, and has been unchanged since.

2.2.2. Large transport aircraft requirements

The same rule appears in CAR Part 4b Airplane Airworthiness; Transport Categories (§ 4b.604(h)), as amended on 31st of December 1953:

"CAR 4b.604 Powerplant instruments

(h) An individual oil pressure indicator for each engine and either an independent warning device for each engine or a master warning device for all engines with means for isolating the individual warning circuit from the master warning device,"

The oil pressure indication / warning rules were subsequently revised in CAR Amendment 4b-6 adopted on 8th of July 1956, becoming in the process:

"CAR 4b.604 Powerplant instruments

(k) Oil pressure indicator for each independent pressure oil system of each engine.

(l) Oil pressure warning means for each engine or a master warning means for all engines with provision for isolating the individual warning means from the master warning means."

This clearly fits interpretation 1. The preamble of CAR Amendment 4b-6 does not address specifically this modification, which suggest the rule modification belong to changes "which are relatively minor, clarifying, or of an editorial nature", as generally described in the last paragraph of the amendment preamble. In other words, the previous rule is clarified, not amended.

In FAR 25 Amendment 1 issued 1st of February 1965 § 4b.604 was re-codified as FAR 23.1305(l) and (m).

The rules were renumbered 25.1309(a)(4) and (a)(5) by FAR 25 Amendment 25-23 effective 8th of May 1970; the text is unchanged today and is also included in CS-25 (as CS 25.1305(a)(4) and (a)(5)).

Lessons learned

The changes introduced into large transport airplane rules support interpretation 1.

3. EASA CERTIFICATION POLICY

3.1. EASA POLICY

Considering rotorcraft and large transport aircraft rules were initially identical, it is logical to assume interpretation 1 should also be retained for CS 29.1305(b)(1).

- Considering that both interpretations have been accepted in the past;
- Considering that no adverse in-service experience has been readily identified with designs sharing a single sensor or a single transmission chain for measuring the pressure and for triggering the low pressure warning;
- Considering that on a Category A helicopter; the worst consequence is likely to remain an engine IFSD, classified 'major' (to be confirmed by the safety assessment for each design);
- Based upon the historical evidence;

CS 29.1305(b)(1) should be interpreted as follows:

The following are required power plant instruments:

For Category A rotorcraft:

- *An individual oil pressure indicator for each engine; and*
- *An oil pressure warning for each engine or a master warning for all engines with means for isolating the individual warning circuit from the master warning device.*

3.2. WHO THIS CERTIFICATION MEMORANDUM AFFECTS

All CS-29 / CS-27 Category A applicants.

4. REMARKS

1. Suggestions for amendment(s) to this EASA Certification Memorandum should be referred to the Certification Policy and Planning Department, Certification Directorate, EASA. E-mail CM@easa.europa.eu or fax +49 (0)221 89990 4459.
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