

This document was created to make public non-proprietary data contained in Special Conditions, Exemptions (now an obsolete definition), Deviations and Equivalent Safety Findings that are part of the applicable Certification Basis as recorded in Type Certificate Data Sheet (TCDS) EASA.R.008 since the initial Type Certification.

Some data from the original files have been edited for the sake of readability.

Note: This document is only updated when necessary. It is therefore likely, that 'Issue' number differs from the related TCDS. In case of necessary corrections please contact vtol@easa.europa.eu.

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DGAC letter 6518 (17 August 1976) Initially issued for the AS 350 B	
APPLICABILITY:	AS 350 B, AS 350 D, AS 350 B1, AS 350 B2, AS 350 BA, AS 350 BB
REQUIREMENTS:	FAR 27, Amdt. 10, CC.27.903(a), SC.A.1 (affecting FAR 27.51 through 27.79), SCA. 2, SC.C.1 (affecting FAR 27.1309 and 27.1351), SC.C.2. (affecting FAR 27.1323)
ADVISORY MATERIAL:	---

Certification conditions are based on FAR 27 Amdt. 10 inclusive, with following conditions:

Appendix II:

Annex 1: French Complementary Condition

The following paragraph of FAR 27 must be amended to read as follows:

- Complementary Condition CC. 27.903(a) "Engine type certification" *Each engine must be type certificated.*

Annex 2: AS 350 Special Conditions

A. Special Conditions - Flight:

A.1 - Take-off Power Check Procedures

A means must be provided to permit the pilot to determine that the engine is capable of developing the power used in establishing the applicable performance data prescribed in §§ 27.51 through 27.79.

A.2 - Main Rotor Low Speed Warning

There must be a warning that is clear and distinctive to the pilot in all flight conditions when the main rotor speed is approaching unacceptable low rotational speeds.

- (1) The warning must be provided by a device that will give clearly distinguishable indications under all flight conditions. A visual device that requires the attention of the crew within the cockpit is not acceptable by itself. An audible device that is used in meeting this requirement must incorporate a means to silence the signal after its activation.
- (2) The rotor speed at which the warning is activated must permit avoidance of unsafe rotor speeds under all flight conditions without exceptional piloting skill or strength.

B. Special conditions - Propulsion:

B.1 - Powerplant controls

No probable failure or malfunction, or combination thereof, in any powerplant control system may cause the failure of any powerplant function necessary for safety.

B.2 - Turbine Engine Bleed Air System

- (a) No hazard may result if duct rupture or failure occurs anywhere between the engine port and the rotorcraft unit served by the bleed air.
- (b) The effect on rotorcraft and engine performance of using maximum bleed air must be established and the information must be contained in the Rotorcraft Flight Manual.

C. Special conditions – Systems and Equipment:

C.1 - Operation without Normal Electrical Power

In addition to the requirements of §§ 27.1309 and 27.1351, the following apply:

It must be shown by analysis, test, or both, that the helicopter can be operated safely in VFR conditions, for a period of not less than five minutes with the normal electrical power system (electrical power sources excluding the battery)

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inoperative, with critical type fuel (from the standpoint of flameout and restart capability), and with the helicopter initially at the maximum certificated altitude. Parts of the electrical system may remain on if:

- (a) A single malfunction, including a bundle or junction box fire, cannot result in loss of the part turned off and the part remaining on;
- (b) The parts remaining on are electrically and mechanically isolated from the parts turned off; and
- (c) The wire insulation and the materials of the parts of the system remaining on have self-extinguishing properties that meet the requirements set forth in § 25.853(a) in effect on 20 June 1968.

C.2. Nickel Cadmium Battery Installation

In addition to the requirement of § 27.1323, the following apply:

Nickel Cadmium battery installations capable of being used to start an engine or auxiliary power unit must have:

- 1. A system to control the charging rate of the battery automatically so as to prevent battery overheating;
- 2. A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or
- 3. A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of a battery failure.

If compliance is shown with subparagraphs (2) or (3) of this condition, the operating procedures for disconnecting the battery from its charging source must be established and included in the Rotorcraft Flight Manual.

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DGAC letter 6437 (28 July 1977)	
Initially issued for the AS 350 B	
APPLICABILITY:	AS 350 B, AS 350 D, AS 350 B1, AS 350 B2, AS 350 BA, AS 350 BB
REQUIREMENTS:	SC.D.1 (affecting FAR 27.867)
ADVISORY MATERIAL:	- - -

The following condition shall be added to the Special Conditions in Annex 2 of DGAC Letter 6518 of 17 August 1976:

D. Special Conditions - Structure:

D.1 Structure protection against lightning

- (a) The rotorcraft must be protected against catastrophic lightning effects.
- (b) As far as metal components are concerned, the compliance with paragraph (a) in this section can be demonstrated by:
 - 1. A correct electrical bonding of the components to the structure, or
 - 2. A component design such that one single lightning strike will not jeopardize the safety of the rotorcraft.
- (c) As far as non-metallic components are concerned, the compliance with paragraph (a) in this section can be demonstrated by:
 - 1. A component design that minimises the effect of a lightning strike, or
 - 2. Incorporating acceptable means to deviate the electrical current resulting from lightning in order to avoid jeopardising the helicopter's safety.

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DGAC letter 53639 (25 June 1985)	
Initially issued for the AS 350 B1	
APPLICABILITY:	AS 350 B1, AS 350 B2, AS 350 BA, AS 350 BB
REQUIREMENTS:	A.T.C No 27.143 (affecting FAR 27.143), A.T.C No 27.695 (affecting FAR 27.695)
ADVISORY MATERIAL:	- - -

The Certification Bases of AS 350 B1 are as reported in DGAC Letter No. 6518 dated 17 August 1976 with the addition, as regards flight control loads, of the following two additional technical conditions (Appendix 1 of the letter), and, as regards electrical circuitry, the provision of an overvoltage protection for the generator installed in AS 350 B1.

Additional Technical Conditions (A.T.C.):

A.T.C. No 27.143: Controllability and manoeuvrability

Paragraphs (a) to (e) are unchanged. The following is added:

(f) Should marginal conditions exist as regards the loads to be applied by the pilot during the tests required in paragraphs (a), (b), (c), (d) and (e) above, the “limit loads” shall not exceed the recommendations given in the following table:

Load applied on controls	Pitch		Roll		Yaw		Collective	
	lb	daN	lb	daN	lb	daN	lb	daN
Temporary application	60	26.7	30	13.3	130	57.8	60	26.7
Protracted application	10	4.4	5	2.22	20	8.9	10	4.4

A.T.C. No 27.695: Slaved control system and servo-control

Paragraphs (a) to (c) are unchanged. The following is added:

(d) Further to a simple failure in the power part of the system, the “pilot loads” to be applied to demonstrate a compliance with paragraph (a) above shall not exceed the following limits:

Load applied on controls	Pitch		Roll		Yaw		Collective	
	lb	daN	lb	daN	lb	daN	lb	daN
Temporary application	60	26.7	30	13.3	130	57.8	60	26.7
Protracted application	25	11.1	15	6.7	80	35.6	35	15.6

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DGAC letter 53151 (9 February 1989)	
APPLICABILITY:	AS 350 B2 (initial TC)
REQUIREMENTS:	FAR 27 Amdt. 10, CC.27.903(a), SC.A.1 (affecting FAR 27.51 through 27.79), SC A.2, SC.C.1 (affecting FAR 27.1309 and 27.1351), SC.C.2. (affecting FAR 27.1323), SC.D.1 (affecting FAR 27.867), A.T.C No 27.143 (affecting FAR 27.143), A.T.C No 27.695 (affecting FAR 27.695)
ADVISORY MATERIAL:	- - -

AS 350 B2 is derived from the AS 350 B and B1 version. As a consequence, certification basis of AS 350 B2 is identical to the ones used for AS 350 B and AS 350 B1 (FAR 27, Amdt. 10 inclusive, with conditions raised in DGAC letters 6518, 6437 and 53639).

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DGAC letter 53881 (14 August 1991)	
APPLICABILITY:	AS 350 BA (initial TC)
REQUIREMENTS:	FAR 27 Amdt. 10, CC. 27.903(a), SC. A.1 (affecting FAR 27.51 through 27.79), SC A. 2, SC.C.1 (affecting FAR 27.1309 and 27.1351), SC.C.2. (affecting FAR 27.1323), SC.D.1 (affecting FAR 27.867), A.T.C No 27.143 (affecting FAR 27.143), A.T.C No 27.695 (affecting FAR 27.695)
ADVISORY MATERIAL:	- - -

Certification basis of AS 350 BA is identical to the ones used for AS 350 B, AS 350 B1 and AS 350 B2 (FAR 27 Amdt. 10 inclusive, with conditions raised in DGAC letters 6518, 6437, 53639 and 53151).

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DGAC letter 971726 (3 April 1997)	
APPLICABILITY:	AS 350 B3 (initial TC)
REQUIREMENTS:	FAR 27 Amdt. 10, CC.27.903(a), FAR 27.51 to 27.79, FAR 27.1309, FAR 27.1351, FAR 27.1323
ADVISORY MATERIAL:	- - -

The AS 350 B3 certification requirements are based on FAR 27, Amdt. 10 inclusive, with the following complementary and special conditions:

APPENDIX 1 – Complementary French Conditions to the FAR 27 regulations including Amdt. 10

The following paragraph of FAR 27 must be amended to read as follows:

- Complementary Condition CC.27.903(a) "Engine type certification": *Each engine must obtain a type certification.*

APPENDIX 2 - Special Conditions for the AS 350 helicopter

A. SPECIAL FLIGHT CONDITIONS:

A.1. Power control procedure

The pilot must dispose of suitable means to ensure that the engine is capable of delivering the required power to achieve the performance levels specified in the FAR 27 regulations, sections 27.51 to 27.79.

A.2. Main rotor "low speed" warning

There must be a warning function, clearly identified by the pilot in all flight conditions and indicating that the main rotor speed is nearing an unacceptable low value.

1. The warning function must consist in a device giving very clear indications in all flight conditions. A visual display device requiring the crew's attention, in the cockpit, is not sufficient in itself. An aural alarm device, in order to meet the first condition, must include a shutdown control for the aural device once triggered.
2. The rotor speed at which the signal is triggered must permit, in all flight conditions, all hazardous rotor speeds to be avoided, without requiring an effort or exceptional flying skills.

B. SPECIAL CONDITIONS CONCERNING THE POWERPLANT:

B.1. Powerplant control

No failure or malfunction or combination of both occurrences affecting an engine control system must result in the loss of an engine function involved in flight safety.

B.2. Engine air sampling system

- a) No hazard should result from the failure or the damaging of their sampling system at any point located between the air sampling pick-off on the engine and the helicopter part supplied with the sampling air;
- b) The influence of the use of the maximum sampling airflow on the helicopter's and the engine's performance levels must be clearly established and specified in the helicopter's flight manual.

C. SPECIAL CONDITIONS CONCERNING THE SYSTEMS AND EQUIPMENT ITEMS:

C.1. Helicopter operation without normal electrical power supply

In addition to the requirements in the regulation section FAR 27.1309 and 27.1351, the following provisions shall apply:

It must be demonstrated by analysis or by tests or by both processes that the helicopter can be used in safety in VFR conditions for a period of at least 5 minutes with the normal electrical power supply system inoperative (all electrical current sources defective except for the battery), with the critical fuel (from the fire extinguishment and in-flight relighting capability standpoints) and with the helicopter initially flying at the maximum certified altitude. Certain components of the electrical system may remain connected provided that:

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- b) The parts remaining connected are electrically and mechanically insulated from the part thus disconnected, and the electrical cable insulation as well as the materials which make up the electrical system parts remaining connected, feature self-extinguishing properties in compliance with the requirements in paragraph FAR 25.853(a) in force since June 20th 1968.

C.2. Cadmium Nickel battery installation

In addition to the requirements in FAR 27.1323 regulations, the following provisions are applicable:

The cadmium nickel battery installations which can be used for starting an engine or the auxiliary power unit (APU) must include:

1. Automatic control function for the battery charge rate, in order to avoid a thermal runaway of the battery;
2. A battery temperature sensor and an overtemperature warning system, with a function which permits the battery to be disconnected from its source in case of overtemperature; or
3. A battery failure detector and warning system with a function which permits the battery to be disconnected from its source in case of battery failure.

In the case when this requirement is met by one of the means stipulated in paragraph 2 or 3 of this clause, the operational procedures for disconnecting the battery from its source must be established and mentioned in the rotorcraft's flight manual.

D. SPECIAL CONDITIONS CONCERNING THE STRUCTURE:

D.1. Structure protection against lightning

- a) The rotorcraft must be protected against the catastrophic effects of lightning.
- b) As regards the metallic components conformity to paragraph (a) in this section must be demonstrated by:
1. A correct bonding of the components to the structure; or
 2. Components so designed that one single lightning strike cannot endanger the rotorcraft safety.
- c) As regards non-metallic components conformity to paragraph 9a) in this section can be demonstrated:
1. By components so designed as to minimise the effect of a lightning strike,
 2. By incorporating acceptable means to deviate the electrical current resulting from lightning in order to avoid any hazard affecting the rotorcraft

APPENDIX 3: Special Conditions applicable to the AS 350 B3 helicopter certification

"GENERAL" SPECIAL CONDITION:

As the AS 350 B3 helicopter involves the use of new technologies (digital engine control or governor), an in-service endurance demonstration is required.

SC.A1

The applicant must perform all the flights deemed necessary by the authority in order to determine that there is a reasonable assurance that the aircraft, its components and its equipment are reliable and operate correctly. Taking into account the fact that the Arriel 2B engine is of the same type as the Arriel 2S1 engine already in use on a certified aircraft, these flights must include at least 150h of operation with a standard certified set of engines.

Construction and acceptable conformity method

The expressions "reasonable assurance" and "reliable" imply that a sufficient number of flights be performed and that the incidents encountered in the course of said flights be reported in order to be analysed and corrected in accordance with specific procedures prescribed in the servicing manual. This also entails that:

The aircraft form the subject of a definition in conformity with the type to be certified;

During these endurance flights, the aircraft be implemented and maintained in accordance with the procedures prescribed for its normal use.

To ensure a strict conformity, the adjustment and certification flights should not be taken into account for the endurance testing process. However, if the definition of the aircraft used, or of its equipment and systems, is close to

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that of the type to be certified, the flights performed in this definition configuration can be taken into account, provided that suitable reducing coefficients are applied.

These coefficients are:

- 0.2 for the adjustment and certification flight,
- 0.5 for the demonstration flight, if their nature is close to the normal aircraft use (for example, demonstration flights intended for the customers)

However at least one third of the required number of flying hours must be performed in the actual endurance testing conditions.

On the occasion of these endurance test flights, the minimum crew's workload in normal operation can also be assessed.

"EQUIPMENT" SPECIAL CONDITION:

General

The AS 350 B3 helicopter includes a digital engine control system (governor) and will be equipped with an engine monitoring instrumentation (by means of VMD display screens). The experience in service on other aircraft has demonstrated that these systems in operation are susceptible to the external electromagnetic interferences either of original origin (various effects of lightning) or generated by human activity.

The following special conditions require the integration of both the electromagnetic interferences of natural origin and those due to human activity.

SC.E1: HIRF

For the engines and equipment items newly installed on the AS 350 B3 helicopter, the interim policy JAA dated 1 January 1991 (Policy paper Number INT/POL/27&29/1 Protection from the effects of HIRF) is applicable.

SC.E2: Lightning

For the engines and equipment items newly installed on the AS 350 B3 helicopter, the following paragraphs of the FAR 27 regulations under Amdt. 23, are applicable: 610, 1309 and 1337.

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CRI C-1 (EC 130 B4) Exemption for rear seat bench: Emergency landing dynamic conditions	
APPLICABILITY:	EC 130 B4
REQUIREMENTS:	JAR 27.562
ADVISORY MATERIAL:	- - -

Statement of Issue:

The objective of JAR 27.562 is to protect occupants against the dynamic acceleration effects during an emergency crash landing.

The requirements of this paragraph concerning the emergency dynamic landing conditions were introduced with FAR 27 Amdt. 25, dated 13 November 1989. They did not exist for the first AS 350 model certification and were not applied in the certification of subsequent models because the rear seat bench remained unchanged. All these certified models were based on FAR 27 Amdt. 10.

Exemption:

As only minor changes are planned to the rear seat bench equipped with belt and shoulder harness and as the EC 130 B4 is considered as an AS 350 B3 derivative, the exemption requested by Airbus Helicopters to the use of the paragraph JAR 27.562 for the EC 130 B4 certification is granted.

This position is based on data provided by Airbus Helicopters covering the following subjects:

- In-service experience
- Comparison of AS 350 and EC 130 B4 rear seat bench and landing gear
- Evaluation of alternatives.Tolerance to weight increase

This exemption is granted by DGAC-F following consultation with JAA NAAs as per JCVP procedures.

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CRI D-1 (EC 130 B4) Exemption for rear seat bench: Seats, berths, safety belts and harness	
APPLICABILITY:	EC 130 B4
REQUIREMENTS:	JAR 27.785 (a), (b), (j)
ADVISORY MATERIAL:	- - -

Statement of Issue:

Airbus Helicopters requested an exemption to the use of the paragraph JAR 27.562 for the equipped rear seat bench certification (CRI C-1) and to the parts of the sub-paragraphs JAR 27.785 (a), (b) & (j) making reference to the paragraph JAR 27.562.

Exemption:

As this exemption is linked to the exemption request related to the JAR 27.562 paragraph use (cf CRI C-1 (EC 130 B4) Exemption for rear seat bench: Emergency landing dynamic conditions) and as only minor changes are planned to the equipped rear seat bench, DGAC-F agreed to grant the following exemption for equipped rear seat bench certification:

- Sub-paragraph JAR 27.785 (a): The text "*and dynamics conditions specified in JAR 27 562*" is cancelled
- Sub-paragraph JAR 27.785 (b): The text "*except as provided for in JAR 27 562 (c) (5)*" is cancelled
- Sub-paragraph JAR 27.785 (j) is deleted

This exemption was granted following consultation with JAA NAAs as per JCVP procedures.

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CRI E-1 (EC 130 B4) Exemption for fuel systems: Fuels system crash resistance	
APPLICABILITY:	EC 130 B4
REQUIREMENTS:	JAR 27.952 (a), (c), (d), (f) & (g)
ADVISORY MATERIAL:	- - -

Statement of Issue:

The objective of the JAR 27.952 is to minimise the hazard of fuel fires to occupants following a survivable crash landing.

The requirements of this paragraph concerning the fuel system crash resistance were introduced with JAR 27 issue dated September 6, 1993, did not exist for the first AS 350 model certification and were not applied in the certification of subsequent models because the fuel system remained unchanged. All these certified models were based on FAR 27, Amdt. 10.

As only minor changes are planned to the parts involved in the fuel system drop test and as the EC 130 B4 is considered as an AS 350 B3 derivative, Airbus Helicopters requested an exemption to the use of the sub-paragraphs JAR 27.952 (a), (c), (d), (f) and (g) for the fuel system certification.

Exemption:

As only minor changes are planned to the fuel system and surrounding fuel tank structure, DGAC-F agreed to grant the requested Exemption based on data provided Airbus Helicopters' concerning the following subjects:

- Comparison of AS 350 and EC 130 B4 fuels system and surrounding fuel tank structure
- In-service experience
- Evaluation of alternatives
- Tolerance to weight increase

This exemption was granted following consultation with JAA NAAs as per JCVP procedures.

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CRI E-04 (EC 130 B4) ESF: Main Gearbox Oil Filter Bypass indicator	
APPLICABILITY:	EC 130 B4, EC 130 T2
REQUIREMENTS:	JAR 27.1027 (b) (2)
ADVISORY MATERIAL:	ACJ

Statement of Issue:

According to JAR 27.1027 (b)(2), each pressure lubrication system must have a filter equipped with a means to indicate the collection of contaminants at or before the opening of the bypass.

In the EC 130 B4, the oil line of the Main Gear Boxes (MGB) oil cooling system located between the radiator and the MGB has a filter, but without means to indicate collection of contaminants at or before its opening.

Equivalent Level of Safety¹:

The filter used is manufactured in accordance with standards established by FAA for aircraft and engine applications.

Airbus Helicopters proposed and DGAC-F accepted this design to be compliant with the regulation by equivalent safety due to the following compensating factors:

- The filter is oversized and has high trapping capacity
- The potential causes of creating particles are reduced and particles produced cannot clog the filter
- For an efficient preventive maintenance, the filter will be removed periodically

¹ 'Equivalent Level of Safety' (ELOS) is similar to 'Equivalent Safety Finding' (ESF). ELOS is the wording currently used.

CRI F-01 (EC 130 B4) SC: Protection from the effects of High Intensity Radiated Field (HIRF)	
APPLICABILITY:	EC 130 B4
REQUIREMENTS:	JAR 27.1309 (a) & (c)
POLICY REFERENCE:	INT/POL/27,29/1 issue 2

Statement of Issue:

EC 130 B4 is equipped with digital electronics systems that may perform critical or essential functions and the applicable type certification regulations do not contain adequate or appropriate safety standards for the protection of these systems from effects of High Intensity Radiated Field (HIRF). As a Special Condition is necessary, Airbus Helicopters raised this CRI.

Special Condition:

After discussion and NAA acceptance, DGAC-F established that the Special Condition is constituted by the interim policy reference INT/POL/27, 29/1 issue 2, dated 1 June 1997.

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CRI F-03 (EC 130 B4) ESF: Powerplant instrument markings	
APPLICABILITY:	EC 130 B4
REQUIREMENTS:	JAR 27.1549 (b)
ADVISORY MATERIAL:	AC 29-2B, Change 1, § 781 (b)(7)

Statement of Issue:

JAR 27.1549 (b) requests that “*Each normal operating range must be marked with a green arc or green line*”. Airbus Helicopters proposed an Equivalent Safety Finding for the normal operating ranges which are not marked with a green arc or line.

Equivalent Level of Safety²:

AC 29-2B change 1 § 781(b)(7) refers to §6 of AC 20-88B which states that “*The advent of the CRT display allows greater flexibility in the design of instrument marking scheme [...] If all abnormal conditions are adequately indicated by specific design features, green marking are unnecessary based upon an equivalent safety finding.*”

In the instance of EC 130 B4, the powerplant instruments are grouped on the VEMD (Vehicle and Engine Management Display). The cautionary ranges are marked with yellow arcs and the limits are marked with red lines (according to AC 27.1 paragraph 781). In addition, the digital values associated with the trend information are underlined with yellow or red lines when the cautionary ranges or the limits are exceeded.

Such attention getters are accepted as satisfactory mean to compensate the lack of green arc.

Moreover, such electronic screens without green arcs or lines have already been approved on many aircraft.

Based on the previous considerations, DGAC-F accepted this design to be compliant with the regulation by equivalent safety following consultation with JAA NAAs as per JCVP procedures.

² ‘Equivalent Level of Safety’ (ELOS) is similar to ‘Equivalent Safety Finding’ (ESF). ELOS is the wording currently used.

CRI F-01 (AS 350 B2 VEMD) SC: Protection from the effects of High Intensity Radiated Fields (HIRF)	
APPLICABILITY:	AS 350 B2 VEMD
REQUIREMENTS:	FAR 27
ADVISORY MATERIAL:	- - -

Statement of Issue:

As AS 350 B2 helicopter VEMD (Vehicle and Engine Management Display) major change referenced 073264 is related to the installation of digital electronics systems that may perform critical, hazardous or major functions and as the FAR 27 applicable type certification regulations do not contain adequate or appropriate safety standards for the protection of these systems from effects of High Intensity Radiated Fields (HIRF), a Special Condition is necessary.

Special Condition:

As agreed by EASA, this Special Condition is constituted by the JAA interim policy referenced INT/POL/27, 29/1 issue 2, dated 1 June 1997 and is applicable to this modification.

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CRI F-2 (AS 350 B2 VEMD) SC: Lightning	
APPLICABILITY:	AS 350 B2 VEMD
REQUIREMENTS:	FAR 27
ADVISORY MATERIAL:	- - -

Statement of Issue:

As AS 350 B2 helicopter VEMD (Vehicle and Engine Management Display) major change referenced 073264 is related to the installation of digital electronics systems that may perform critical, hazardous or major functions and that the FAR 27 applicable type certification regulations do not contain adequate or appropriate safety standards for the protection from the external electromagnetic interferences, a Special Condition is necessary.

Special Condition:

As agreed by EASA, for the equipment items newly installed on the AS 350 B2 helicopter, the following paragraph of the FAR 27 regulations 610, 1309 and 1337, under Amdt. 23, are applicable and adequate to protect the helicopter against interference from lightning.

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CRI F-5 (AS 350 B2 VEMD) ESF: Powerplant instrument markings	
APPLICABILITY:	AS 350 B2 VEMD
REQUIREMENTS:	FAR 27-149 (b)
ADVISORY MATERIAL:	- - -

Statement of Issue:

For the AS 350 B2 helicopter VEMD major change referenced 073264, the VEMD (Vehicle and Engine Management Display) includes a Flight Limitation Indicator (FLI) without a green arc or green line for the normal operating range. However, the paragraph JAR 27.1549 (b) requests: *"Each normal operating range must be marked with a green arc or green line"*.

An Equivalent Safety Finding is requested by Airbus Helicopters for the normal operating ranges which are not marked with a green arc or line.

Equivalent Level of Safety³:

Airbus Helicopters proposed and EASA accepted this design to be compliant to the requirement JAR 27.1549 by equivalent safety, based on the following design considerations:

- The powerplant instruments are grouped on the VEMD (vehicle and engine management display). The normal operating ranges are not marked with a green arc or line. Nevertheless, the cautionary ranges are marked with yellow arcs, and the limits are marked with red lines according to AC 27.1 paragraph 781. In addition, the digital values associated with the trend information are underlined with yellow or red lines when the cautionary ranges or the limits are exceeded. Such attention getters, only available on electronic screens, have been already accepted as satisfactory mean to compensate the lack of green arc in addition to the fact that such screens are more legible.
- Such electronic screens without green arcs or lines have already been approved on many aircraft.
- AC 29-2B change 1 § 781(b)(7) refers to § 6d of AC 20-88B which states that *«the advent of the CRT display allows greater flexibility in the design of instrument marking scheme...»* then further *«if all abnormal conditions are adequately indicated by specific design features, green marking are unnecessary based upon an equivalent safety finding»*.

EASA also noted that similar one have already been evaluated and granted on other aircraft

³ 'Equivalent Level of Safety' (ELOS) is similar to 'Equivalent Safety Finding' (ESF). ELOS is the wording currently used.

CRI C-03 (AS 350 B3) EtC: Compliance with crash landing conditions in the fuel tank area	
APPLICABILITY:	AS 350 B3 incorporating AH modification OP-4605 (installation of a fuel system improving crashworthiness)
REQUIREMENTS:	CS-27, Amdt. 3, Paragraph 27.561(c)
ADVISORY MATERIAL:	AC 27-1B Chg. 3

Elect to Comply:

For a/c incorporating mod. OP-4605 (*) requirement CS 27.561 (c) Amdt. 3, dated 11 December 2012 is replacing same numbered paragraph of FAR 27 for the following elements of the fuel tank lower structure, affected by this modification: cradles, longitudinal beams, X-stops and rods.

Note:

(*)The modification OP-4605 consists in the incorporation of a new fuel system, with improved crashworthiness capability in the AS 350 B3 type model fitted with the Arriel 2D Engine.

Disclaimer – This document is not exhaustive and it will be updated gradually.
An update of this document will not cause an update of the TCDS.



CRI D-01 (X1) SC: Structure protection against lightning	
APPLICABILITY:	AS 350 B3 With following modifications (MOD): <ul style="list-style-type: none">- OP-4305 (Arriel 2D engine installation), and additionally,- 07-5601 (Tail rotor control mechanism modification),- 07-5600 (Tail rotor blade reinforcement),- 07-8551 (Tail Gear Box control lever modification)
REQUIREMENTS:	CS 27.610(a) ,b), (c)
ADVISORY MATERIAL:	AC27-1B change 1, ED-14E, ED-84, ED-91, ED-105, ED-113, AC20-53B

Statement of issue:

FAR PART 27 at amendment 10 does not include requirements for structure protection against lightning and static electricity.

For AS 350 B3 model certification basis applicable requirements for structure protection against lightning have been prescribed by Special Condition D.1. Structure protection against lightning.

Since the requirements for lightning protection per SC D.1. are now incorporated in CS 27 the latter will be used as a basis.

Special conditions:

The applicant shall comply with the requirements of paragraph CS 27.610(a),(b), and (c) of CS-27 Amdt. 1, dated 30 November 2007.

For Compliance with CS 27.610 the following Interpretative Material and Acceptable Means of Compliance shall be used:

- a) EUROCAE ED-14E "Environmental Conditions and Test Procedures for Airborne Equipment"
- b) EUROCAE ED-84 (including Amendment No. 1 dated 06/09/99) / ARP-5412 "Aircraft lightning environment and related test waveforms" latest issue (including Amendment No. 1).
- c) EUROCAE ED-91 (including Amendment No. 1 dated 06/09/99) / ARP-5414 "Aircraft lightning zoning" – latest issue (including Amendment No. 1).
- d) EUROCAE ED-105 "Aircraft Lightning Test Methods"
- e) EUROCAE ED-113 "Aircraft Lightning Direct Effects Certification"
- f) AC20-53B

Note:

This CRI D-01 shall be applicable only to the changed product areas which are changed or affected by the X1 modification.

Disclaimer – This document is not exhaustive and it will be updated gradually.
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CRI E-01 (X1) SC: Rotor drive system endurance test for HIP	
APPLICABILITY:	AS 350 B3 With following modifications (MOD): <ul style="list-style-type: none">- OP-4305 (Arriel 2D engine installation), and additionally,- 07-5601 (Tail rotor control mechanism modification),- 07-5600 (Tail rotor blade reinforcement),- 07-8551 (Tail Gear Box control lever modification)
REQUIREMENTS:	FAR 27.923
ADVISORY MATERIAL:	AC 27-1B

Statement of issue:

Part of the Eurocopter X1 programme (AS 350 B3 modification) includes a new engine, the Turbomeca Arriel 2D, replacing Arriel 2B1 model.

This new Arriel 2D engine allows a take-off power duration increase from 5 to 30 minutes leading to creation of a new power referred to as "Hover-Increased Power" (HIP) and defined (by a combination of power level and duration of use) as follows:

The power equivalent, in terms of power levels, to the Take Off Power and intended to be used for continuous periods of up to 30 minutes at any time between the take-off and landing phases.

Since in the airworthiness code applicable to the X1 modification there are no requirements for rotor drive system and control mechanism tests carried out under HIP conditions, being the HIP considered a novel design feature (in accordance with Part 21A.16B a Special Condition is necessary) this CRI defines the requirements for rotor drive system and control mechanism tests which are specific for <AS 350 B3 + X1>.

Special condition:

The applicant should undertake a test of the transmission system, including the tail rotor drive system to comply with a modified version of FAR 27.923(f) that reflects the proposed increase in duration at Max Take Off Power.

Therefore, for this CRI only, a modified version of FAR 27.923(f) shall now require: "The part of the test prescribed in paragraph (e) of this section must be conducted in intervals of not less than thirty minutes."

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CRI E-02 (X1) SC: Power Plant Control	
APPLICABILITY:	AS 350 B3 With following modifications (MOD): <ul style="list-style-type: none">- OP-4305 (Arriel 2D engine installation), and additionally,- 07-5601 (Tail rotor control mechanism modification),- 07-5600 (Tail rotor blade reinforcement),- 07-8551 (Tail Gear Box control lever modification)
REQUIREMENTS:	CS 27.1141(e)
ADVISORY MATERIAL:	- - -

Statement of issue:

FAR Part 27 at amendment 10 does not include specific requirements for effects of failures or malfunctions in power plant control systems. For AS 350 B3 model certification basis applicable requirements have been prescribed by Special Conditions B.1 Power plant control in Appendix 2 to DGAC letter 971726.

Since the requirements for effects of failures or malfunctions in power plant control systems per SC B.1. are now incorporated in CS-27 the latter will be used as a basis for the requirements of this Special Condition.

Special conditions:

The applicant should comply with the requirements of paragraph CS 27.1141(e) of CS-27 Amdt. 1, dated 30 November 2007.

Disclaimer – This document is not exhaustive and it will be updated gradually.
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CRI F-01 (X1) SC: Protection from effects of HIRF	
APPLICABILITY:	AS 350 B3 With following modifications (MOD): - OP-4305 (Arriel 2D engine installation), and additionally, - 07-5601 (Tail rotor control mechanism modification), - 07-5600 (Tail rotor blade reinforcement), - 07-8551 (Tail Gear Box control lever modification)
REQUIREMENTS:	CS 27.1309
POLICY REFERENCE:	INT/POL/27&29/1, Issue 3, dated 1 October 2003

Statement of issue:

There is no requirement for the protection of electrical/electronic systems from High Intensity Radiated Field threat at the moment in the Certification Specification for Small Rotorcraft CS-27. The purpose of this CRI is to state the EASA policy on HIRF requirements for Small Rotorcraft certification projects until a final rule is issued.

During a long time the EASA policy was based on the JAA interim Policy INT/POL/27&29/1, this policy referred to outdated guidance material. The latest FAA HIRF regulation represents a more recent policy in matter of HIRF and will be used as a base for the requirements of this Special Condition

Special Conditions:

The applicant should comply with the HIRF Special Condition defined as follow.

Special Condition for HIRF:

Protection from the effects of HIRF

The rotorcraft electrical and electronic systems, equipment, and installations considered separately and in relation to other systems must be designed and installed so that:

- (a) Each electrical and electronic system that performs a function whose failure would prevent the continued safe flight and landing of the rotorcraft must be designed and installed so that:
 - (1) The function is not adversely affected during and after the time the rotorcraft is exposed to the Certification HIRF environment as described in appendix 1 (Table I)
 - (2) The system automatically recovers normal operation of that function, in a timely manner, after the rotorcraft is exposed to the certification HIRF environment, as described in appendix 1 (Table I), unless this conflicts with other operational or functional requirements of that system
- (b) The system is not adversely affected during and after the time the rotorcraft is exposed to the Normal HIRF environment as described in Appendix 1 (Table II).
- (c) Each function required during operation under visual flight rules is not adversely affected during and after the time the rotorcraft is exposed to the Severe HIRF environment as described in Appendix 1 (Table III).
- (d) Each system that performs a function, the failure of which would cause large reductions in the capability of the rotorcraft or the ability of the flight crew to cope with adverse operating conditions, is not adversely affected when the equipment providing these functions is exposed to the equipment HIRF test levels defined in Appendix 1 (paragraph (b)).
- (e) Each electrical and electronic system that performs such a function whose failure would reduce the capability of the rotorcraft or the ability of the flight crew to respond to an adverse operating condition must be designed and installed so the system is not adversely affected when the equipment providing these functions is exposed to equipment HIRF test levels defined in Appendix 1 (paragraph (c)).

APPENDIX 1

a) HIRF environments

Table I lists the Certification HIRF environment required by Special Condition for HIRF sub-paragraph (a).

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Table II lists the Normal HIRF environment required by Special Condition for HIRF sub-paragraph (b).

Table III lists the Severe HIRF environment required by Special Condition for HIRF sub-paragraph (c).

b) Test levels for complying with Special Condition for HIRF sub-paragraph (d)

As a minimum, one of the following sets of equipment test levels shall be used:

- 1) From 10 kHz to 400 MHz, use conducted susceptibility tests with CW and 1 kHz square wave modulation of depth greater than 90 percent. The conducted susceptibility current shall start at 0.6 mA at 10 kHz, increasing 20 dB per frequency decade to 30 mA at 500 kHz. From 500 kHz to 40 MHz, the conducted susceptibility current shall be 30 mA. From 40 MHz to 400 MHz, the conducted susceptibility should decrease of 20 dB per decade from 30 mA to 3 mA. From 100 MHz to 400 MHz, use radiated susceptibility tests at 20 V/m peak, with CW and 1 kHz square wave modulation of depth greater than 90 percent. From 400 MHz to 8 GHz, use radiated susceptibility tests at 150 V/m peak with pulse modulation of 4 percent duty cycle with a 1 kHz pulse repetition frequency. This signal should be switched on and off at a rate of 1 Hz with a duty cycle of 50 percent (ref. ED-14D/DO-160F (or later), Section 20, Cat. RR).
- 2) Or, the test level to be used during equipment testing may be based on the Normal HIRF environment in Table II with allowance made for rotorcraft attenuation using rotorcraft transfer function/attenuation curves. Testing must cover the frequency band of 10 kHz to 8 GHz.

c) Test levels for complying with Special Condition for HIRF sub-paragraph (e)

As a minimum, the following equipment test level shall be used:

From 10 kHz to 400 MHz, use conducted susceptibility tests, starting at 0.15 mA at 10 kHz, increasing 20 dB per frequency decade to 7.5 mA at 500 kHz. From 500 kHz to 40 MHz, use conducted susceptibility tests at 7.5 mA. From 40 MHz to 400 MHz, the conducted susceptibility should decrease of 20 dB per decade from 7.5 mA to 0.75 mA. From 100 MHz to 8 GHz, use radiated susceptibility tests at 5 V/m (ref. ED-14D/DO-160F (or later), Section 20, CAT TT).

d) Test procedures (issue 3) [see EASA position (issue 3) in the CRI]

Although EUROCAE ED-14F/RTCA Document DO-160 issue C to E are providing acceptable procedures for qualification of airborne equipment, EUROCAE ED-14F/RTCA Document DO-160F (or later), Section 20 dated March 2005 should be referred to for the applicability of tests and test details.

EUROCAE ED-107 dated March 2001 (or later) also provide for additional guidance, in particular regarding level A system test.

Disclaimer – This document is not exhaustive and it will be updated gradually.
An update of this document will not cause an update of the TCDS.



TABLE I
Certification HIRF Environment

FREQUENCY	FIELD STRENGTH (V/m)	
	PEAK	AVERAGE
10 kHz - 100 kHz	50	50
100 kHz - 500 kHz	50	50
500 kHz - 2 MHz	50	50
2 MHz - 30 MHz	100	100
30 MHz - 70 MHz	50	50
70 MHz - 100 MHz	50	50
100 MHz - 200 MHz	100	100
200 MHz - 400 MHz	100	100
400 MHz - 700 MHz	700	50
700 MHz - 1 GHz	700	100
1 GHz - 2 GHz	2000	200
2 GHz - 4 GHz	3000	200
4 GHz - 6 GHz	3000	200
6 GHz - 8 GHz	1000	200
8 GHz - 12 GHz	3000	300
12 GHz - 18 GHz	2000	200
18 GHz - 40 GHz	600	200

TABLE II
Normal HIRF Environment

FREQUENCY	FIELD STRENGTH (V/m)	
	PEAK	AVERAGE
10 kHz - 100 kHz	20	20
100 kHz - 500 kHz	20	20
500 kHz - 2 MHz	30	30
2 MHz - 30 MHz	100	100
30 MHz - 70 MHz	10	10
70 MHz - 100 MHz	10	10
100 MHz - 200 MHz	30	10
200 MHz - 400 MHz	10	10
400 MHz - 700 MHz	700	40
700 MHz - 1 GHz	700	40
1 GHz - 2 GHz	1300	160
2 GHz - 4 GHz	3000	120
4 GHz - 6 GHz	3000	160
6 GHz - 8 GHz	400	170
8 GHz - 12 GHz	1230	230
12 GHz - 18 GHz	730	190
18 GHz - 40 GHz	600	150

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TABLE III
Severe HIRF Environment

FREQUENCY	FIELD STRENGTH (V/m)	
	PEAK	AVERAGE
10 kHz - 100 kHz	150	150
100 kHz - 500 kHz	200	200
500 kHz - 2 MHz	200	200
2 MHz - 30 MHz	200	200
30 MHz - 70 MHz	200	200
70 MHz - 100 MHz	200	200
100 MHz - 200 MHz	200	200
200 MHz - 400 MHz	200	200
400 MHz - 700 MHz	730	200
700 MHz - 1 GHz	1400	240
1 GHz - 2 GHz	5000	250
2 GHz - 4 GHz	6000	490
4 GHz - 6 GHz	7200	400
6 GHz - 8 GHz	1100	170
8 GHz - 12 GHz	5000	330
12 GHz - 18 GHz	2000	330
18 GHz - 40 GHz	1000	420

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CRI F-02 (X1) SC: Immunity from effects of lightning	
APPLICABILITY:	AS 350 B3 With following modifications (MOD): <ul style="list-style-type: none">- OP-4305 (Arriel 2D engine installation), and additionally,- 07-5601 (Tail rotor control mechanism modification),- 07-5600 (Tail rotor blade reinforcement),- 07-8551 (Tail Gear Box control lever modification)
REQUIREMENTS:	CS 27.610, CS 27.1309
ADVISORY MATERIAL:	- - -

Statement of issue:

The AS 350 B3 helicopter incorporating the X1 modification includes a digital engine control system and is equipped with an electronic engine monitoring instrumentation (by means of Vehicle and Engine Management Display VEMD screens). The experience in service on other aircraft has demonstrated that these systems are susceptible to external electromagnetic interferences (EMI) either of natural origin (various effects of lightning) or generated by human activity.

The following special condition requires immunity from EMI of natural origin, including lightning and static electricity.

Special Conditions:

For the engine and equipment items newly installed on the AS 350 B3 helicopter incorporating the X1 modification the following paragraphs of CS-27 Amdt. 1, dated 30 November 2007 are applicable:

- CS 27.610
- CS 27.1309

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CRI G-01 (X1) ESF: Powerplant Instrument Markings	
APPLICABILITY:	AS 350 B3 With following modifications (MOD): <ul style="list-style-type: none">- OP-4305 (Arriel 2D engine installation), and additionally,- 07-5601 (Tail rotor control mechanism modification),- 07-5600 (Tail rotor blade reinforcement),- 07-8551 (Tail Gear Box control lever modification)
REQUIREMENTS:	FAR 27.1549 (b)
ADVISORY MATERIAL:	AC 27-1B

Statement of issue:

The (AS 350 B3 + X1 modification) product incorporates VEMD (Vehicle and Engine Management Display). The X1 modification affects presentations of information displayed on VEMD, including powerplant instruments.

The paragraph FAR 27.1549 (at Amdt. 10) requests:

For each required powerplant instrument —

...

(b) Each normal operating range must be marked with a green arc or green line not extending beyond the maximum and minimum safe operating limits [...];

Powerplant instruments as displayed on VEMD do not feature normal operating ranges marked with a green arc or line.

Equivalent Level of Safety⁴:

Airbus Helicopters proposed and EASA accepted this design to be compliant to the requirement FAR 27.1549 by equivalent safety based on the following consideration:

“The cautionary ranges are marked with yellow arcs and the limits are marked with red lines. In addition, the digital values associated with the trend information are underlined with yellow or red lines when the cautionary ranges or the limits are exceeded. Such attention getters are accepted as satisfactory mean to compensate the lack of green arc.”

Such kind of powerplant instruments design has already been evaluated and accepted on other helicopters (to include AS 350 B3, AS 350 B2 VEMD, EC 120/130/135/145/155).

⁴ ‘Equivalent Level of Safety’ (ELOS) is similar to ‘Equivalent Safety Finding’ (ESF). ELOS is the wording currently used.

Disclaimer – This document is not exhaustive and it will be updated gradually.
An update of this document will not cause an update of the TCDS.



CRI N-01 (X1) Noise standards	
APPLICABILITY:	AS 350 B3 With following modifications (MOD): <ul style="list-style-type: none">- OP-4305 (Arriel 2D engine installation), and additionally,- 07-5601 (Tail rotor control mechanism modification),- 07-5600 (Tail rotor blade reinforcement),- 07-8551 (Tail Gear Box control lever modification)
REQUIREMENTS:	Commission Regulation (ec° No 1702/2003, Annex (Part 21) Part 21A.18
ADVISORY MATERIAL:	CS-36

Statement of issue:

As described in CRI A-01, paragraph 21A.18 of the Part 21 Annex of the European Commission Regulation 1702/2003 "Designation of applicable environmental protection requirements and certification specifications" applies as follows:

Compliance with the applicable noise requirements is a prerequisite for the issue of a type certificate change approval for an aircraft. These requirements are prescribed according to the provisions of Chapter 1 of ICAO Annex 16, Volume I, Part II to the Chicago Convention and for helicopters, in Volume I, Part II, chapters 8 and 11 as applicable and as implemented in Decision no. 2003/4/RM amended by Decision 2007/007/R of The Executive Director of the Agency dated 2 April 2007, on certification specifications providing for acceptable means of compliance for aircraft noise ("CS-36, Amendment 1").

Elect to comply:

Airbus Helicopters elects to comply with

- the Amendment 9 of ICAO Annex 16 which is associated with CS-36 Amendment 2
- Chapter 11 of Annex 16 and the associated noise limits of Chapter 11.4.1

Disclaimer – This document is not exhaustive and it will be updated gradually.
An update of this document will not cause an update of the TCDS.



CRI F-01 (X2) SC: Protection from Effects of High Intensity Radiated Field (HIRF)	
APPLICABILITY:	EC 130 T2
REQUIREMENTS:	JAR 27.1309
ADVISORY MATERIAL:	ARP 5583/ED 107 issue A

Statement of Issue:

JAR 27 does not contain sufficient safety standards for protection of electrical/electronic systems from High Intensity Radiated Fields (HIRF) threat. This CRI is raised to ensure sufficient protection from the effects of HIRF.

The following Special Condition defines the HIRF requirements for all new or modified (as compared to EC 130 B4) items of electrical and electronic equipment incorporated in EC 130 T2 which perform critical and essential functions. This shall include those items installed and approved on the predecessor model under modification as well as such items which have not been modified physically but have been affected in a way impacting their HIRF vulnerability or their functions' criticality.

ARP 5583/ED 107 issue A is acceptable guidance material.

Special Condition for HIRF:

Protection from the effects of HIRF

The rotorcraft electrical and electronic systems, equipment, and installations considered separately and in relation to other systems must be designed and installed so that:

- (a) Each electrical and electronic system that performs a function whose failure would prevent the continued safe flight and landing of the rotorcraft must be designed and installed so that:
 - (1) The function is not adversely affected during and after the time the rotorcraft is exposed to the Certification HIRF environment as described in appendix 1 (Table I).
 - (2) The system automatically recovers normal operation of that function, in a timely manner, after the rotorcraft is exposed to the certification HIRF environment, as described in appendix 1 (Table I), unless this conflicts with other operational or functional requirements of that system.
- (b) The system is not adversely affected during and after the time the rotorcraft is exposed to the Normal HIRF environment as described in Appendix 1 (Table II).
- (c) Each function required during operation under visual flight rules is not adversely affected during and after the time the rotorcraft is exposed to the Severe HIRF environment as described in Appendix 1 (Table III).
- (d) Each system that performs a function, the failure of which would cause large reductions in the capability of the rotorcraft or the ability of the flight crew to cope with adverse operating conditions, is not adversely affected when the equipment providing these functions is exposed to the equipment HIRF test levels defined in Appendix 1 (paragraph (b)).
- (e) Each electrical and electronic system that performs such a function whose failure would reduce the capability of the rotorcraft or the ability of the flight crew to respond to an adverse operating condition must be designed and installed so the system is not adversely affected when the equipment providing these functions is exposed to equipment HIRF test levels defined in Appendix 1 (paragraph (c)).

APPENDIX 1

a) HIRF environments

Table I lists the Certification HIRF environment required by Special Condition for HIRF sub-paragraph (a).

Table II lists the Normal HIRF environment required by Special Condition for HIRF sub-paragraph (b).

Table III lists the Severe HIRF environment required by Special Condition for HIRF sub-paragraph (c).

b) Test levels for complying with Special Condition for HIRF sub-paragraph (d)

As a minimum, one of the following sets of equipment test levels shall be used:

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- 1) From 10 kHz to 400 MHz, use conducted susceptibility tests with CW and 1 kHz square wave modulation of depth greater than 90 percent. The conducted susceptibility current shall start at 0.6 mA at 10 kHz, increasing 20 dB per frequency decade to 30 mA at 500 kHz. From 500 kHz to 40 MHz, the conducted susceptibility current shall be 30 mA. From 40 MHz to 400 MHz, the conducted susceptibility should decrease of 20 dB per decade from 30 mA to 3 mA. From 100 MHz to 400 MHz, use radiated susceptibility tests at 20 V/m peak, with CW and 1 kHz square wave modulation of depth greater than 90 percent. From 400 MHz to 8 GHz, use radiated susceptibility tests at 150 V/m peak with pulse modulation of 4 percent duty cycle with a 1 kHz pulse repetition frequency. This signal should be switched on and off at a rate of 1 Hz with a duty cycle of 50 percent (ref. ED-14D/DO-160F (or later), Section 20, Cat. RR).
- 2) Or, the test level to be used during equipment testing may be based on the Normal HIRF environment in Table II with allowance made for rotorcraft attenuation using rotorcraft transfer function/attenuation curves. Testing must cover the frequency band of 10 kHz to 8 GHz.

c) Test levels for complying with Special Condition for HIRF sub-paragraph (e)

As a minimum, the following equipment test level shall be used:

From 10 kHz to 400 MHz, use conducted susceptibility tests, starting at 0.15 mA at 10 kHz, increasing 20 dB per frequency decade to 7.5 mA at 500 kHz. From 500 kHz to 40 MHz, use conducted susceptibility tests at 7.5 mA. From 40 MHz to 400 MHz, the conducted susceptibility should decrease of 20 dB per decade from 7.5 mA to 0.75 mA. From 100 MHz to 8 GHz, use radiated susceptibility tests at 5 V/m (ref. ED-14D/DO-160F (or later), Section 20, CAT TT).

d) Test procedures (issue 3) [see EASA position (issue 3) in the CRI]

Although EUROCAE ED-14F/RTCA Document DO-160 issue C to E are providing acceptable procedures for qualification of airborne equipment, EUROCAE ED-14F/RTCA Document DO-160F (or later), Section 20 dated March 2005 should be referred to for the applicability of tests and test details.

EUROCAE ED-107 dated March 2001 (or later) also provide for additional guidance, in particular regarding level A system test.

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TABLE I
Certification HIRF Environment

FREQUENCY	FIELD STRENGTH (V/m)	
	PEAK	AVERAGE
10 kHz - 100 kHz	50	50
100 kHz - 500 kHz	50	50
500 kHz - 2 MHz	50	50
2 MHz - 30 MHz	100	100
30 MHz - 70 MHz	50	50
70 MHz - 100 MHz	50	50
100 MHz - 200 MHz	100	100
200 MHz - 400 MHz	100	100
400 MHz - 700 MHz	700	50
700 MHz - 1 GHz	700	100
1 GHz - 2 GHz	2000	200
2 GHz - 4 GHz	3000	200
4 GHz - 6 GHz	3000	200
6 GHz - 8 GHz	1000	200
8 GHz - 12 GHz	3000	300
12 GHz - 18 GHz	2000	200
18 GHz - 40 GHz	600	200

TABLE II
Normal HIRF Environment

FREQUENCY	FIELD STRENGTH (V/m)	
	PEAK	AVERAGE
10 kHz - 100 kHz	20	20
100 kHz - 500 kHz	20	20
500 kHz - 2 MHz	30	30
2 MHz - 30 MHz	100	100
30 MHz - 70 MHz	10	10
70 MHz - 100 MHz	10	10
100 MHz - 200 MHz	30	10
200 MHz - 400 MHz	10	10
400 MHz - 700 MHz	700	40
700 MHz - 1 GHz	700	40
1 GHz - 2 GHz	1300	160
2 GHz - 4 GHz	3000	120
4 GHz - 6 GHz	3000	160
6 GHz - 8 GHz	400	170
8 GHz - 12 GHz	1230	230
12 GHz - 18 GHz	730	190
18 GHz - 40 GHz	600	150

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TABLE III
Severe HIRF Environment

FREQUENCY	FIELD STRENGTH (V/m)	
	PEAK	AVERAGE
10 kHz - 100 kHz	150	150
100 kHz - 500 kHz	200	200
500 kHz - 2 MHz	200	200
2 MHz - 30 MHz	200	200
30 MHz - 70 MHz	200	200
70 MHz - 100 MHz	200	200
100 MHz - 200 MHz	200	200
200 MHz - 400 MHz	200	200
400 MHz - 700 MHz	730	200
700 MHz - 1 GHz	1400	240
1 GHz - 2 GHz	5000	250
2 GHz - 4 GHz	6000	490
4 GHz - 6 GHz	7200	400
6 GHz - 8 GHz	1100	170
8 GHz - 12 GHz	5000	330
12 GHz - 18 GHz	2000	330
18 GHz - 40 GHz	1000	420

Disclaimer – This document is not exhaustive and it will be updated gradually.
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CRI E-02 (X2) SC: Rotor drive system endurance test for HIP rating	
APPLICABILITY:	EC 130 T2
REQUIREMENTS:	JAR 27.923 (1 st issue – Orange Paper 27/98/1)
ADVISORY MATERIAL:	ACJ to JAR-27 (with Amdt. 27/98/1)

Statement of Issue:

The EC 130 T2 includes a new engine, the Turbomeca Arriel 2D, and a MGB modification increasing the MGB power. Also, the maximum take-off power duration is increased, leading to a creation of a new airframe power referred to as “Hover Increased Power” (HIP).

Being thus the HIP considered a novel design feature in accordance with Part 21.A.16B, Airbus Helicopters raised this CRI: a Special Condition is needed since in the applicable airworthiness code there are no requirements for rotor drive system and control mechanism tests carried out under HIP conditions.

Special Condition:

The following sub-paragraphs of JAR 27.923 are modified or interpreted by this Special Condition:

- (c) *A 60-hour part of the test prescribed in sub-paragraph (b) of this paragraph must be run at not less than maximum continuous torque and the maximum speed for use with maximum continuous torque.*
- (d) *A 30-hour... part of the test prescribed in sub-paragraph (b) of this paragraph must be run at not less than 75% of maximum continuous torque and the minimum speed for use with 75% of maximum continuous torque.*
- (e) *A 10-hour part of the test prescribed in sub-paragraph (b) of this paragraph must be run at not less than take-off torque and the maximum speed for use with take-off torque.*
- (f) *The part of the test prescribed in sub-paragraph (e) of this paragraph must be conducted in intervals of not less than 5 minutes.*

JAR 27.923 (c) and (d) shall be interpreted as follows for the EC 130 T2:

When performing the tests required in JAR 27.923 (c) and (d): the maximum continuous power torque limit of the engine, equivalent to the maximum HIP torque limit, is the value of “maximum continuous torque” to be applied.

JAR 27.923 (f) is modified as follows for the EC 130 T2:

“The part of the test prescribed in sub-paragraph (e) of this paragraph must be conducted in intervals of not less than thirty minutes.”

In the establishment of the above, EASA agreed while giving particular consideration to the following operating limitations incorporated in the flight manual:

- continuous use above MCP: 30 min ;
- cumulative use above MCP: 1h per flight.

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An update of this document will not cause an update of the TCDS.



CRI G-01 (X2) ESF: Powerplant instrument markings	
APPLICABILITY:	EC 130 T2
REQUIREMENTS:	JAR 27.1549 (b)
ADVISORY MATERIAL:	ACJ to JAR-27 (with Amdt. 27/98/1)

Statement of Issue:

The modifications introduced with the EC 130 T2 design affect presentations of information displayed on VEMD (Vehicle and Engine Management Display), including powerplant instruments.

JAR 27.1549 requests *“For each required powerplant instrument, as appropriate to the type of instrument [...] each normal operating range must be marked with a green arc or green line, both extending beyond the maximum and minimum safe operating limits [...]”*.

Powerplant instruments as displayed on VEMD do not feature normal operating ranges marked with a green arc or line.

Equivalent Level of Safety⁵:

Airbus Helicopters proposed and EASA accepted this design to be compliant to the requirement JAR 27.1549 by equivalent safety based on the following consideration:

“The cautionary ranges are marked with yellow arcs and the limits are marked with red lines. In addition, the digital values associated with the trend information are underlined with yellow or red lines when the cautionary ranges or the limits are exceeded. Such attention getters are accepted as satisfactory means to compensate the lack of green arc.”

EASA also noted that similar ESF have already been evaluated and granted on other aircraft.

⁵ ‘Equivalent Level of Safety’ (ELOS) is similar to ‘Equivalent Safety Finding’ (ESF). ELOS is the wording currently used.

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Acronyms and Abbreviations

ACJ	Advisory Circulars Joint
A.T.C.	Additional Technical Conditions
Amdt.	Amendment
CRI	Certification Review Item
DEV	Deviation
DGAC FR	Direction Générale de l'Aviation Civile - France
ELOS	Equivalent Level of Safety
ESF	Equivalent Safety Finding
FAR	Federal Aviation Requirements
JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements
JCVP	Joint Certification/Validation Procedures
NAA	National Aviation Authority
SC	Special Condition
TCDS	Type Certificate Data Sheet

– END –

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