

Notification of a Proposal to issue a Certification Memorandum

Net Safety Benefit

Proposed CM–SA-001 Issue 01 issued 26 March 2021

**Regulatory requirements:
CS 23.2510, CS 23.1309 and CS 27.1309.**

EASA Certification Memoranda clarify the European Union Aviation Safety Agency's general course of action on specific certification items. They are intended to provide guidance on a particular subject and, as non-binding material, may provide complementary information and guidance for compliance demonstration with current standards. Certification Memoranda are provided for information purposes only and must not be misconstrued as formally adopted Acceptable Means of Compliance (AMC) or as Guidance Material (GM). Certification Memoranda are not intended to introduce new certification requirements or to modify existing certification requirements and do not constitute any legal obligation.

EASA Certification Memoranda are living documents into which either additional criteria or additional issues can be incorporated as soon as a need is identified by EASA.



Log of issues

Issue	Issue date	Change description
1.0	26/03/2021	Proposed CM for public consultation

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Introduction

Historically, the safety assessment of applications for airworthiness approval have focussed on risks associated with malfunctioning or failing systems and equipment installed on the aircraft. In this process, the operational use of the systems and equipment was assessed, but generally, no credit was provided for the operational safety benefits that the installation of such systems and equipment would provide.

The purpose of this Certification Memorandum (CM) is to provide an approach to the demonstration of compliance to certain CS 23 and CS 27 specifications that is in line with reference standard guidance as adapted to installation of system/ equipment that provide operational safety benefit. This is achieved by introducing credits for systems or equipment that provide operational safety benefits in the determination of the Development Assurance Level (DAL)¹

The intent of the Net Safety Benefit policy is to facilitate the introduction of new, safety enhancing technologies in the current, fleets that have been shown to provide operational safety benefits so as to improve the overall safety performance of the operation.

It should be noted that whilst the FAA's NORSEE policy and EASA's Net Safety benefit policy aim to achieve a similar goal, the scope, applicability and processes of both policies are different. In part this is due to differing regulatory environments. For example; in the EASA system, the so called 'field approvals' do not exist. EASA does however accept 'standard changes' under CS-STAN. The Net Safety Benefit policy is limited to applications for airworthiness approval through a Major Change to an existing Type Certificate or a Supplemental Type Certificate. The policy does not apply to changes covered by CS-STAN or to Minor Changes.

The guidance provided in this CM is non-binding and provides complementary information and guidance with the aim to complement the current CS and associated AMC.

Note: A Rulemaking activity under the RMT.0712 is ongoing to improve the proportionality in CS 27.1309 and associated AMC. One of the objectives of this activity is to define subclasses of small rotorcraft and to allocate more proportionate safety objectives. This CM is designed to complement the current CS and associated AMC and the Agency will assess the impact of any future changes of the CS27.1309 and AMC on this CM and decide on the extension of the applicability.

¹ The wording DAL is used for consistency with the current ACs and AMCs. It refers to IDAL and FDAL.



References

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

Reference	Title	Issue	Date
AC 23.1309-1E	System Safety Analysis and Assessment for Part 23 Airplanes	--	17 November 2011
AC 27-1B	Advisory Circular, AC 27-1B, Certification of Normal Category Rotorcraft	Change 7	Jan 2014
ASTM	F3061/F3061M-17 Standard Specification for Systems and Equipment in Small Aircraft	–	–
ASTM	F3230-17 Standard Practice for Safety Assessment of Systems and Equipment in Small Aircraft	–	–

Abbreviations

AC	Advisory Circular
AEH	Airborne Electronic Hardware
AMC	Acceptable Means of Compliance
ASR	Annual Safety Review
CM	Certification Memorandum
CRI	Certification Review Item
CS	Certification Specification
DAL	Development Assurance Level
EPAS	European Plan for Aviation Safety
FHA	Functional Hazard Assessment
HIRF	High Intensity Radiated Fields
MoC	Means of Compliance
S/W	Software



Roadmap

In recent years, EASA has developed the General Aviation Roadmap ('GA Roadmap') and the Rotorcraft Safety Roadmap. Both roadmaps have been established with the aim of improving the overall safety of the operation.

A review of the rotorcraft accidents in Europe over the last 10 years shows that most accidents occur with small rotorcraft. For these accidents, an increased situational awareness of the pilot or a reduction in the pilots' workload through the provision of automatic stabilisation in flight would have had a positive contribution to safety.

Similar factors have been found to be a major contributor to accidents in General Aviation. This has resulted in the identification of focus areas for safety in the Annual Safety Review (ASR) or the European Plan for Aviation Safety (EPAS). The Net Safety benefit policy is aimed at addressing safety concerns as identified in these documents.

Technologies are now available that could provide significant benefits for General Aviation aeroplanes and rotorcraft overall safety, but these are often considered to be prohibitively costly due to the associated cost of compliance demonstration to some airworthiness requirements. In the case of a small rotorcraft, the lack of sufficient proportionality in the guidance to the specifications adds to the problem. The Agency has already initiated several actions in various domains to introduce proportionality. The intent of this Certification Memorandum (CM) is to facilitate in parallel the introduction of technologies that provide operational safety benefits in the current fleet of general aviation aeroplanes and small rotorcraft in Europe.

Problem Statement

The focus in airworthiness certification has historically been the risks associated with malfunctioning or failing of systems and equipment installed on the aircraft. This is particularly true for compliance demonstration with CS 23.1309, CS 23.2510 and CS 27.1309. Although the '2510/1309' specifications are coded as a qualitative requirement, the guidance to compliance demonstration has evolved over time to require the applicant to implement assurance techniques, along with structured analyses and assessment techniques, that include both qualitative and quantitative elements. These techniques have resulted in the development of systems and equipment that reach unprecedented levels of fault-free operation and integrity of the information that is being provided to the pilot or flight crew. It is recognised however, that safety enhancing equipment is jeopardised by the, often high, cost of compliance demonstration to some industry standards. This is hampering the installation of such equipment in the aircraft within the scope of this CM.

In the current demonstration of compliance to CS 23.1309, CS 25.2510 and CS 27.1309, the operational use of the system is considered when assessing consequences of failures and possible mitigations for the establishment of the classification of the severity of failure conditions. The specific operational benefits that the installation of the system or equipment brings however, are not considered in the Functional Hazard Assessment. The Net Safety Benefit policy aims to introduce the assessment of the operational benefits for specific applications, namely those that contribute to the reduction of accidents in the areas identified in the ASR or EPAS and highlighted above. Thus, the operational benefit is intended to be credited in the certification process.

It does not change the classification of the Failure Condition, nor the occurrence probabilities, but may result in the reduction of the Development Assurance Level (DAL) and thus results in lower development and certification costs, which should ultimately result in lower costs to install safety enhancing equipment on the aircraft.

It is the Agency's intent to extend the Net Safety Benefit policy to offer credit for systems or equipment that provide operational safety benefits to compliance demonstration with CS 23.1306 and CS 27.1316, 'Electrical



and electronic system lightning protection' and CS 23.1308 and CS 27.1317, 'High-Intensity Radiated Fields (HIRF) protection'. At the time of publication of the first issue of this CM, this policy is still under development.

EASA Certification Policy

For the certification and installation of safety enhancing systems and equipment that offer operational safety benefits, the Agency will consider granting credit to the compliance demonstration for development assurance activities which consist **of the reduction of the level of DAL by one level** (for example from DAL B to DAL C). For this credit to be granted, the process described below should be followed. Requests will be considered on a case by case decision.

Conditions and Scope

To be eligible for credit under the Net Safety benefit policy, the following conditions must be met:

- The proposed change is installed on single engine aeroplanes or a small rotorcraft that have the following Certification Basis:
 - o CS-23 (prior to Amdt. 5), JAR-23, PART 23 (prior to Amdt. 64), Class I and II, or
 - o CS-23 Amdt. 5, Certification Level 1 and 2, or
 - o CS-27, JAR-27, PART-27, except small rotorcraft type certificated as Category A, and
- The proposed change addresses one of the safety concerns identified in the Annual Safety Review (ASR) or the European Plan for Aviation Safety (EPAS), and
- The proposed change does not change the operational capability of the aircraft, e.g. a change from VFR to IFR.

The Net Safety Benefit Process

The Net Safety Benefit process follows the standard process, but adds a few steps for the assessment of the operational benefit and the credit that is awarded in the certification process. Since these assessments have been proven to be qualitative and hence somewhat subjective in nature, the assessment will be performed by a board that is established in the Certification Directorate of the Agency for the purpose of conducting the assessment.

Step 1 – Application for Net Safety Benefit credit

An applicant seeking credit for Net Safety Benefit for the proposed change should supply a clear identification of the information listed below:

- A comprehensive description of the change and the aircraft type(s) to which the change is applicable and an indication of the size of the fleet,
- A substantiated justification for the operational safety benefit that the proposed change would offer,
- The Functional Hazard Assessment for the proposed change,
Note: As part of the submittal of the application, the applicant provides the Agency with a Functional Hazard Assessment ('traditional 1309'). Guidance on how to perform an FHA is provided in EUROCAE ED-135/SAE ARP4761. In this FHA, the identification of the potential failure conditions and relevant severity allocation **remains unchanged**. This standard process should be followed until the allocation of the DAL. The Agency will assess the FHA to identify the potential failure conditions which the change may introduce and to assess how these may be mitigated. Special focus should be given to failure conditions involved in the operational safety benefit (e.g. warning to pilots) and to failure conditions associated with the new functions introduced by the change. The Agency will review the relevant failure scenarios and may discuss with the applicant.
- The credit for airworthiness certification that the applicant would like to take, including justification.



Step 2 – Assessment of conditions and scope

The Agency performs an assessment to determine whether the application meets the conditions for eligibility for Net Safety Benefit, including an assessment of the certification basis of the aircraft type(s) on which the proposed change is intended to be installed.

Step 3 – Assessment of operational safety benefits

The Agency performs a qualitative assessment of the impact of the proposed change on the operation with emphasis on potential safety benefits.

Step 4 – Evaluation of the operational benefits and agreement on the credit

The Agency assesses the operational safety benefits against the risks. A review of the FHA is part of this assessment.

If the Agency determines that the proposed change offers an evident operational safety benefit, it will determine the credit that will be offered to the applicant. Based on the outcome of these evaluations, the Agency will decide the application of credit to the DAL, and any specific conditions that may apply. The Agency will decide on a case by case basis and reserves the right to refuse granting any credit based upon the assessment of the operational safety benefits and/or of the net safety benefit.

The decision of the board, the justification for the decision and any applicable specific conditions are documented in a Certification Review Item (CRI) which is shared with the applicant and the Agency's team of Experts involved in the project. It is reminded that the Agency will not accept DAL D for catastrophic failure conditions. When DAL D is expected to mitigate hazardous failure conditions, additional conditions and limitations might be needed.

Step 5 – Compliance demonstration

This CM does not introduce change in the compliance demonstrations activities. The activities associated to DAL agreed with the Agency continue to be performed in accordance with to the applicable standards for System, Software and Airborne Electronic Hardware compliance demonstration.

Note: Various activities are on-going in relation to the demonstration of compliance for Software (S/W) and Airborne Electronic Hardware (AEH) with CS 23.1309, CS 23.2510 and CS 27.1309. The application of the Net Safety Benefit policy in conjunction with new criteria for demonstration of compliance for S/W and AEH may introduce the risk of *double counting* the credit offered to the applicant. For example: The application of the Net Safety benefit policy results in a reduction of the DAL from C to D. This may allow 'System Verification' to be applied as Means of Compliance (MoC). This may be inappropriate for particular changes. The decision on appropriateness of the MoC remains with the Agency.

Who this Certification Memorandum affects

TC/STC holders, DOA holders and APDOA organisations as well as equipment manufacturers seeking EASA approval for the installation of new systems and equipment.



Remarks

1. This EASA Proposed Certification Memorandum will be closed for public consultation on the **30 April 2021**. Comments received after the indicated closing date for consultation might not be considered.
2. 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.
3. For any question concerning the technical content of this EASA Certification Memorandum, please contact:
Name: AUDARD Clément
Function: Safety Coordinator – VTOL
Phone: +49 (0)221 89990 2038
E-mail: clement.audard@easa.europa.eu

