EASA European Union Aviation Safety Agency	**Deviation**	Doc. No.: DEV-POP2HOIST-01 Issue : 1 Date : 13 Jul 2021 Proposed ☒ Final ☐ Deadline for comments: 04 Aug 2021

SUBJECT	:	COLLINS AEROSPACE „Population 2“ Hoist System Installation.
REQUIREMENTS incl. Amdt.	:	CS 29.865 (a), CS 29.1301 (d), CS 29.1309 (a)(b), Amdt. 8.
ASSOCIATED IM/MoC	:	Yes☐ / No ☒
ADVISORY MATERIAL	:	AMC to CS-29 Amdt. 8, EASA CM-HS-004

INTRODUCTORY NOTE:

The following Deviation (Dev) has been classified as important and as such shall be subject to public consultation in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) which states:

"*2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.*"

IDENTIFICATION OF ISSUE:

EASA has received an application for the certification of the installation of Collins Aerospace (formerly UTAS Goodrich) „Population 2“ Hoist System, equipped with an overload clutch, on a rotorcraft type model.

The overload clutch of the hoist presented for certification is subject to EASA AD 2015-0226R5 stemming from the investigation on an in-service event where a failure of the rescue hoist slip clutch allowed the hoist cable to reel-out in an uncontrolled manner.

In order to certify the design of hoist installations suitable for Human External Cargo (HEC) operations, compliance with all the applicable airworthiness requirements and, in particular, with CS 29.865(a), 29.1301(d), 29.1309(a)(b) (including the applicable AMC 29.865 and EASA-CM-HS-004) has to be demonstrated. This shall ensure that the parts and assemblies are appropriately designed, identified and traceable according to the criticality of their failure effect and therefore the risk of unintentional loss of the external / HEC load is appropriately mitigated.

Furthermore, the definition of a suitable flight envelope and the definition of the necessary provisions aimed at guaranteeing stable and predictable in-service performance have to be provided.

It has been determined that demonstrating full compliance with all elements of the requirements listed above, and reproduced here below for readers' convenience, is not possible with the current hoist design. A new or revised fully compliant design is not achievable or available in the period of time for which these hoist equipped rotorcraft are required to be available to conduct hoist operations. However, the purpose of this deviation is to support mainly HEMS and SAR operations pending a new or revised fully compliant hoist becoming available.

CS 29.865 External Loads

(a) It must be shown by analysis, test, or both, that the rotorcraft external-load attaching means for rotorcraft-load combinations to be used for non-human external cargo applications can withstand a limit static load equal to 2.5, or some lower load factor approved under CS 29.337 through 29.341, multiplied by the maximum external load for which authorisation is requested. It must be shown by analysis, test, or both that the rotorcraft external-load attaching means and any complex personnel-carrying device system for rotorcraft-load combinations to be used for human external cargo applications can withstand a limit static load equal to 3.5 or some lower load factor, not less than 2.5, approved under CS 29.337 through 29.341, multiplied by the maximum external load for which authorisation is requested. The load for any rotorcraft-load combination class, for any external cargo type, must be applied in the vertical direction. For jettisonable rotorcraft-load combinations, for any applicable external cargo type, the load must also be applied in any direction making the maximum angle with the vertical that can be achieved in service but not less than 30º. However, the 30º angle may be reduced to a lesser angle if:

(1) An operating limitation is established limiting external load operations to those angles for which compliance with this paragraph has been shown; or

(2) It is shown that the lesser angle cannot be exceeded in service."

CS 29.1301 Function and Installation

Each item of installed equipment must:

(d) Function properly when installed.

CS 29.1309 Equipment, Systems, and Installations

(a) The equipment, systems, and installations whose functioning is required by this CS–29 must be designed and installed to ensure that they perform their intended functions under any foreseeable operating condition.

(b) The rotorcraft systems and associated components, considered separately and in relation to other systems, must be designed so that –

(1) For Category B rotorcraft, the equipment, systems, and installations must be designed to prevent hazards to the rotorcraft if they malfunction or fail; or

(2) For Category A rotorcraft:

(i) The occurrence of any failure condition which would prevent the continued safe flight and landing of the rotorcraft is extremely improbable; and

(ii) The occurrence of any other failure conditions which would reduce the capability of the rotorcraft or the ability of the crew to cope with adverse operating conditions is improbable.

For this reason, any deviation from the specified airworthiness standards shall be identified and justified by the applicant by proposing specific compensating features and mitigating factors that allow the applicant to demonstrate compliance with the following *Essential Requirements for Airworthiness* of Annex II to Regulation (EU) 2018/1139.

§ 1.3.1 The aircraft must not have design features or details that experience has shown to be hazardous.

§ 1.3.2 The aircraft, including those systems, and equipment required for the assessment of the type design, or by operating rules, must function as intended under any foreseeable operating conditions, throughout and sufficiently beyond, the operational envelope of the aircraft, taking due account of the system or equipment operating environment. Other systems or equipment not required for type-certification, or by operating rules, whether functioning properly or improperly, must not reduce safety and must not adversely affect the proper functioning of any other system or equipment. Systems and equipment must be operable without needing exceptional skill or strength.

§ 1.3.3 The aircraft systems and equipment, considered separately and in relation to each other, must be designed such that any catastrophic failure condition does not result from a single failure not shown to be extremely improbable and an inverse relationship must exist between the probability of a failure condition and the severity of its effect on the aircraft and its occupants. With respect to the single failure criterion above, it is accepted that due allowance must be made for the size and broad configuration of the aircraft and that this may prevent this single failure criterion from being met for some parts and some systems on helicopters and small aeroplanes.

Considering all the above, the following Deviation is proposed:

Deviation to CS 29.865 (a), CS 29.1301 (d), CS 29.1309 (a)(b) Amdt. 8.

COLLINS AEROSPACE „Population 2“ Hoist System Installation

Rotorcraft with a Collins Aerospace (formerly UTAS Goodrich) „Population 2“ Hoist System Part Number as identified in Table 1 cannot demonstrate full compliance with all elements of the requirements CS 29.865 (a), CS 29.1301 (d), CS 29.1309 (a)(b) at Amdt. 8.

Table 1 – Affected Collins Aerospace Hoists P/N (all suffixes, unless specified) equipped with an overload clutch

42315	44301-10-4	44301-10-8	44301-10-12	44312	44318
42325	44301-10-5	44301-10-9	44301-10-13	44314	
44301-10-1	44301-10-6	44301-10-10	44301-12	44315	
44301-10-2	44301-10-7	44301-10-11	44311	44316	

The following actions must be completed by the Applicant and are required to ensure safe flight and operation of the aircraft with the aforementioned hoist sytem, by limiting the risks and effects of failure, in compliance with the applicable Essential Requirements for Airworthiness in Annex II of Regulation (EU) 2018/1139:

1. The Applicant shall identify all design features of the hoist design and installation that are similar or identical to those having led to the determination of in-service unsafe conditions, as well as all subsystems that have not yet been shown to meet the intended standards.
2. The Applicant shall make a justified proposal of mitigating measures, such as mandatory maintenance tasks, functional tests, life limits and compensating design features, that appropriately mitigate the potential in-service hazards with the design features and subsystems identified in point 1.
3. The Applicant shall make a justified proposal of a suitable reduction of the maximum hoist payload and/or of the flight envelope for hoist operations, which shall provide sufficient additional safety margins to mitigate residual risks.
4. The Applicant shall make a justified proposal of the specific qualification, instruction and training of the crew operating the hoist system that allow the crew to adequalty manage acceptable risks that are not mitigated otherwise.
5. The applicant shall make a justified proposal of the maximum number of aircraft to which this Deviation may apply, including only newly manufactured rotorcraft. This deviation will be reflected in the EASA TCDS of the rotorcraft type model.