

SUBJECT : **Electric Propulsion Units for CS-23 Normal, Utility, Aerobatic and Commuter Aeroplanes up to Level 1**

REQUIREMENTS incl. Amdt. :

ASSOCIATED IM/AMC¹ : Yes ☒ / No ☐

ADVISORY MATERIAL : **AMC 20-115D**

INTRODUCTORY NOTE:

The following Special Condition 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:

An applicant has made an application for the certification of an electric propulsion unit (called hereafter EPU). It consists of an electric motor associated with its controller (inverter). The motor and the inverter are liquid cooled. The liquid cooling system (heat exchanger, coolant tank, draining capabilities...) and the energy storage devices are not included in the scope of this special condition.

This type of EPU is intended to be installed on CS-23 Normal, Utility, Aerobatic and Commuter Aeroplanes up to Level 1.

Any EPU that shows compliance with this Special Condition could also be installed on CS-22 Sailplanes and Powered Sailplanes, CS-LSA Light Sport Aeroplanes and CS-VLA Very Light Aeroplanes.

The certification specifications that are usually applicable to aircraft engines are contained in CS-E amendment 5, CS-22 Subpart H, or Special Condition EA-42 "Airworthiness Standard for CS-22H Electrical Retractable Engine to be operated in Powered Sailplanes"

However they do not cover the case of an EPU for CS-23 Normal, Utility, Aerobatic and Commuter Aeroplanes up to Level 1.

The applicant has proposed to use the ASTM F3338-18 "Standard Specification for Design of Electric Propulsion Units for General Aviation Aircraft" as the basis to define the certification requirements.

However the scope of the referenced ASTM standard needs to be modified to fully address the intended design of the applicant. Some adjustments are required to take into account the extended scope of the product to be certified, especially the fact that the engine is liquid cooled.

¹ In case of SC, the associated Interpretative Material and/or Acceptable Means of Compliance may be published for awareness only and they are not subject to public consultation.

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for Hazardous EPU Effects to be assessed. For EPU certification, it is acceptable to consider that the intent of this paragraph has been achieved if the probability of a Hazardous EPU Effect arising from an individual Failure can be predicted to be not greater than [10% of the safety objective associated with the intended aircraft application] per EPU flight hour.

- It shall be shown that Major EPU Effects are predicted to occur at a rate not in excess of that defined as Remote (probability shall be consistent with the safety objective associated with the intended aircraft application).

[...]

- 5.20.3: The purpose of the Endurance and Durability Test is to establish the ratings and the limitations of the EPU as well as assessing the reliability of the EPU overall design. In the absence of detailed Means of Compliance (MoC) in the ASTM F3338-18, the applicant may refer to CS-E 440 and the associated AMC to define an acceptable means of compliance to 5.20.3.
- 5.25: to be deleted.

Note: If an applicant seeks to include the propeller in the EPU type design, this propeller shall meet all requirements contained in CS-P or CS-22 subpart J depending on the intended aircraft application.



