

SUBJECT : Flight Guidance System – Speed excursion protection

REQUIREMENTS incl. Amdt: CS 25.1329(h) at Amdt 27

ASSOCIATED IM/MoC: Yes / No

ADVISORY MATERIAL: AMC No 1 to CS 25.1329, AMC N°2 to CS 25.1329 at Amdt 27

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INTRODUCTORY NOTE:

The following Equivalent Safety Finding (ESF) 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."

ABBREVIATIONS:

ADR	Air Data Reference
AP	Autopilot
FD	Flight Director
ATHR	Autothrust
CAS	Calibrated Airspeed

IDENTIFICATION OF ISSUE:


EASA received an application for the certification of a new function on a Large Aeroplane, which allows to maintain the flight guidance functions (AP/FD/ATHR) engaged in spite of several ADR sources failed or under conditions leading to the unreliability of one or more airspeed data sources.

The new function allows to provide a continuous aircraft guidance and alleviates the flight crew workload in presence of these failure conditions with unreliable airspeed data.

The new function is constituted by three operating modes:

1. AP/ATHR on single ADR: maintains AP, FD and A/THR availability when only one ADR airspeed data source is considered reliable.
2. AP/ATHR on Backup Data: maintains AP, FD and A/THR availability when the backup airspeed data source is the only reliable airspeed data source.
3. Backup AP/ATHR: adapts the vertical command and thrust to maintain a vertical speed/flight path angle equal to zero considering the current aircraft altitude and weight when the status of all airspeed data sources are unreliable including the backup airspeed data source. The A/THR also has a backup mode which sets the engine rotational speed N1 controlling the aeroplane to fly at a safe speed in terms of CAS and Mach number.

CS25.1329(h) at Amdt. 27 requests the implementation of an airspeed protection as follows:

 <p>EASA European Union Aviation Safety Agency</p>	<p>CRI Consultation paper</p> <p>Equivalent Safety Finding</p>	<p>Doc. No: ESF-F25.1329-01</p> <p>Issue: 1</p> <p>Date: 7 September 2022</p> <p>Proposed <input checked="" type="checkbox"/> Final <input type="checkbox"/></p> <p>Deadline for comments: 28 September 2022</p>
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“(h) When the flight guidance system is in use, a means must be provided to avoid excursions beyond an acceptable margin from the speed range of the normal flight envelope. If the aircraft experiences an excursion outside this range, the flight guidance system must not provide guidance or control to an unsafe speed.”

When one of the first two modes are active, direct compliance with CS 25.1329(h) at Amdt. 27 can be demonstrated.

However, when the last mode is active, i.e. the Backup AP/ATHR, compliance with CS 25.1329(h) cannot be shown, as there is no reliable airspeed data source available and there is no airspeed indication available to the flight crew.

Compliance with CS 25.1329(h) presumes that reliable airspeed data is available. However, the third mode of the new function is intended to maintain a level of automation when there is no reliable airspeed data. Therefore, an equivalent safety finding to CS 25.1329(h) has been requested by the applicant.

Considering all the above, the following Equivalent Safety Finding is proposed.



ESF-F25.1329-01**Equivalent Safety Finding****Flight Guidance System – Speed excursion protection****1. APPLICABILITY**

This ESF is applicable to Large Aeroplanes with a flight guidance system designed to provide guidance without any reliable source of airspeed data available.

1.1 AFFECTED CS

CS 25.1329(h) at Amendment 27.

2. EQUIVALENT SAFETY FINDING

In lieu of direct compliance with CS 25.1329(h), and provided that the below compensating factors are complied with, a mechanism might be implemented to protect the aeroplane from excursions beyond an acceptable margin from the airspeed range of the normal flight envelope that is not based on sensed airspeed.

3. COMPENSATING FACTORS

- a) In cases where no reliable airspeed data source is available, other protection mechanism(s) must be provided to ensure that the aircraft remains in its normal flight envelope.
- b) The protection mechanism(s) per 3.a) must be shown to meet the first objective set by CS 25.1329(h) *'avoiding excursion beyond an acceptable margin from the speed range of the normal flight envelope'*.
- c) The protection mechanism(s) per 3.a) must be shown to meet the second objective of CS 25.1329(h) in case of speed excursion outside of the normal flight envelope: *'If the aircraft experiences an excursion outside this range, the flight guidance system must not provide guidance or control to an unsafe speed.'*
- d) If dedicated flight crew action is required, this must be clearly indicated to the flight crew in compliance with JAR/CS 25.1322¹ and the difference in training properly assessed and addressed via the Operational Suitability Data.
- e) The AFM must include corresponding limitations and procedures, if any.

¹ The JAR or CS 25.1322 amendment indicated in the type certification basis of the actual change applies.