



European Union Aviation Safety Agency
Comment-Response Document (CRD) to CPTS-0000398 Issue 01

Comment-Response Document (CRD) to CPTS-0000398 Issue 01 on
“Bird Strike and Ingestion - Bird orientation”

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1. Summary of the outcome of the consultation

During the public consultation of the above referenced proposed Special Condition from 16 September 2024 to 08 October August 2024, EASA has received:

- 13 comments
- From 6 different commenters.



2. Individual comments (and responses)

In responding to comments, EASA states its position as follows:

- (a) **Accepted** — EASA agrees with the comment and any proposed change is incorporated into the text.
- (b) **Partially accepted** — EASA either partially agrees with the comment or agrees with it but the proposed change is partially incorporated into the text.
- (c) **Noted** — EASA acknowledges the comment, but no change to the text is considered necessary.
- (d) **Not accepted** — EASA does not agree with the comment or proposed change.

(General Comments)

comment	1	comment by: <i>Luftfahrt-Bundesamt</i>
	The LBA has no comments.	
response	Noted	

comment	10	comment by: <i>Rolls-Royce plc</i>
	<p><u>General Comment</u></p> <p>Comment summary</p> <p>This Special Condition recognises that the industry standard for tests to CS-E 800 is to present the bird(s) axially. Is there a value to amending the AMC to CS-E 800 to reflect this?</p> <p>Suggested resolution</p> <p>Not related to the Special Condition document, but it relates to its introduction</p>	
response	<p>Noted.</p> <p>EASA will consider in the future whether the AMC should be revised.</p>	

comment	11	comment by: <i>Rolls-Royce plc</i>
	<p><u>General Comment</u></p> <p>Comment summary</p> <p>Subject case of 90degrees Yaw is outside of range of yaw / side-slip envelope defined against CS-E 30 for "our" products. Should there be some recognition against CS-E 30?</p> <p>Suggested resolution</p>	

	Possible addition of "Range of potential impact conditions examined should be consistent with published Application Assumptions (CS-E 30.)"
response	Not accepted. The case of 90-degree (yaw) bird presentation to the engine is an assumption of the Applicant derived from the investigation of the events, not related to assumptions covered under CS-E 30.
comment	12 comment by: FOCA (Switzerland) Thank you for the opportunity to comment. We have no remarks on this document.
response	Noted

2. SPECIAL CONDITION

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comment	2 comment by: Federal Aviation Administration Paragraph 2 "Special Condition" requires an assessment that an impact of an appropriately sized bird of any orientation will not lead to an IFSD or hazardous engine effects. CS-E 800(c) and CS-E 800(d) do not specify a particular bird orientation, as far as I can tell. AMC E 800 does not offer guidance on specific bird impact orientation either. As such, it seems that alternate bird impact orientations are already addressed by the existing CS-E 800 regulations, as part of assessing the most critical impact condition for a particular bird ingestion test. The CS-E 800 requirements were based on many real world bird ingestion tests (which could conceivably involve bird impacts of many different orientations) and there is no specific requirement to bind the birds (to ensure or favor a particular impact orientation) before the tests. In summary, perhaps this special condition is superfluous and unnecessary?
response	Not accepted. Bird orientation is neither excluded nor included as a parameter to be considered by Applicants for the identification of the critical ingestion parameters. However, it is EASA understanding that the rule does not require consideration of the bird orientation for the purpose of determining the test conditions. It was reasonably assumed that bird orientation would affect impact energy and thrust lost, however the effects would be normally minor. As it is not practical to control the bird orientation during the test and still meet other critical ingestion parameters (e.g. critical target location), the testing has always been based on axial bird orientation with no additional requirement for assessment of the impact of the bird orientation. The events caused an immediate IFSD, including the fracture of the fan blade near the root, therefore there is a need to assess the bird orientation specifically for this design to achieve the objectives of CS-E 800(a). Much of the real-world data used for supporting the definition of the rule does not include conclusive information on the bird species or bird masses. Consequently, the bird mass introduced in the definition of the rule was, to some extent, inferred from the damage to the engine for



each particular event. The fidelity of the data is not sufficient to allow understanding of the incremental effect of the presentation of the bird.

comment 13

comment by: DGAC France

DSAC France would like to thank you for this consultation.

The special condition concludes that “the Applicant must also demonstrate that an impact of any bird, with a mass as specified by CS-E 800(c) and/or CS-E 800(d) but in any orientation, will not lead to an immediate IFSD or Hazardous Engine Effect”.

We would like to draw the attention of EASA on the fact that this wording could be ambiguous regarding the applicable test conditions and then application acceptance test criteria.

Indeed, the SC does not state explicitly that test conditions specified by CS-E 800(c) still apply but with any bird orientation (only the masses specified by CS-E 800 are explicitly applicable). Moreover, one of the acceptance test criteria in CS-E 800(c) is that “the test of CS-E 800(c)(1)(v) must not cause a Hazardous Engine Effect. Again, it is not clear whether all the other acceptance test criteria remain applicable under the proposed SC. We believe that they should remain applicable (the test of CS-E 800(c)(1)(v) must not cause the Engine to be unable to complete the required test schedule, the Engine to be shut down before end of step 6, a sustained reduction in thrust to less than 50% Rated Take-off Thrust during step 1; the absence of immediate IFSD does not cover all these test acceptance criteria).

The same comment applies to CS-E 800(d), the test conditions and acceptance criteria should also remain applicable (the ingestion must not cause more than a sustained 25% power or thrust loss, the Engine to be shut down during the test).

response

Partially accepted.

The acceptance criteria for the SC is included in the SC, that is, “will not lead to an immediate IFSD or Hazardous Engine Effect”. Therefore, the acceptance criteria as per CS-E 800(c)(2) and CS-E 800(d)(2) would not be applicable when the bird orientation is considered. The wording in the SC has been accordingly changed with further clarifications:

From: “the Applicant must also demonstrate that an impact of any bird, with a mass as specified by CS-E 800(c) and/or CS-E 800(d) but in any orientation, will not lead to an immediate IFSD or Hazardous Engine Effect

To: “the demonstration of compliance must also require to re-evaluate compliance with CS-E 800(c) and/or CS-E 800(d), as applicable depending on the evidence above, but including the impact of any bird with any bird yaw orientation to the centre line, and with a modified acceptance criteria that the ingestion will not lead to an immediate IFSD or an Hazardous Engine Effect.

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comment 3

comment by: UK CAA



Commentor:	UK CAA
Page No:	4
Paragraph No:	1
Comment:	<p>Text proposed by EASA: <i>This Special Condition is applicable to turbine engines that, due to the engine design and construction characteristics, might show a potential shortfall in integrity capabilities or performance response to the required intent of CS-E 800 following a bird strike in a different orientation that the axial benchmark test. This shortfall might not be revealed by CS-E 800(c) and/or CS-E 800(d) as currently written.</i></p> <p>Justification: Suggested improvement to the draft text:</p> <p>Proposed Text:</p> <p>Change from “that” to “than” – to read better.</p> <p>This Special Condition is applicable to turbine engines that, due to the engine design and construction characteristics, might show a potential shortfall in integrity capabilities or performance response to the required intent of CS-E 800 following a bird strike in a different orientation than the axial benchmark test. This shortfall might not be revealed by CS-E 800(c) and/or CS-E 800(d) as currently written.</p>
response	<p>Partially accepted.</p> <p>Paragraph has been reworded for clarity.</p>

comment

4

comment by: *Rolls-Royce plc***Page 4 Section 2 (a)****Comment summary**

The words suggest that the ingestion conditions for the Large Flocking bird special condition could be broader than CS-E 800 (c). i.e. Is the intent that the demonstration of compliance should be at 90% thrust, 200kts, above 50% span, or at any conditions? A broadening of the ingestion conditions combined with a LFB in any orientation is a substantial increase in severity.

Suggested resolution

	<p>Could this be added to the Special Condition, to lay out what is expected?</p>
response	<p>Noted.</p> <p>The test conditions remain applicable as commented. This has been reflected in the SC by incorporating the text "in addition to the requirements in CS-E 800(c)", which includes CS-E 800(c)(1).</p> <p>No change to the text is therefore considered necessary.</p>
comment	<p>5 comment by: <i>Rolls-Royce plc</i></p> <p><u>Page 4 Section 2 (a)</u></p> <p>Comment summary</p> <p>Is the intent for the Medium bird Special Condition, that only a single bird should be considered (not a flock, as per CS-E 800 (d))?</p> <p>Suggested resolution</p> <p>This could be made explicit in the text</p>
response	<p>Noted.</p> <p>The intent is that for compliance with the SC, the orientation of the birds is also considered when determining the test conditions under CS-E 800(d)(1) and (d)(3). This is reflected by the text "any bird". For example, for compliance with CS-E 800(d)(1) in the case of two or more birds, for each bird and targeted location, the effect of the orientation for each bird should be considered.</p> <p>No change to the text is therefore considered necessary.</p>
comment	<p>6 comment by: <i>Rolls-Royce plc</i></p> <p><u>Page 4 Section 2 (a)</u></p> <p>Comment summary</p> <p>From context, "when evidence exists" would seem to refer to service / in-field experience.</p> <p>Suggested resolution</p> <p>Please clarify anticipated source(s) of evidence .e.g service experience, engine or rig test development finding, etc.</p>
response	<p>Noted.</p> <p>The word "evidence" is intended to cover any source available to the Applicant obtained during development, certification or operation. When</p>

only service experience is intended, CS-E usually specifies it, for example: "in-service events", "in-service operation", or "field events".

No change to the text is therefore considered necessary.

comment

7

comment by: *Rolls-Royce plc***Page 4 Section 2 (a)****Comment summary**

There is no mention of the Acceptable Means of Compliance in the Special Condition. Is the intent that this could be testing, service evidence, or analysis?

Suggested resolution

If there is any intent to restrict allowable means of compliance, then an AMC section or equivalent should be introduced.

response

Noted.

There is no restriction intended in the SC. CS-E 800(g) remains applicable.

No change to the text is therefore considered necessary.

comment

8

comment by: *Rolls-Royce plc***Page 4 Section 2 (a)****Comment summary**

The success criterion of the Special Condition is the avoidance of immediate IFSD. Is this the avoidance of immediate uncommanded IFSD?

Suggested resolution

Further clarification would be helpful.

response

Noted.

No distinction is introduced in the SC, therefore it includes both commanded and uncommanded IFSD.

No change to the text is therefore considered necessary.

comment

9

comment by: *Rolls-Royce plc***Page 4 Section 2 (a)****Comment summary**

The use of the word "immediate" is subjective.



response

Suggested resolution

From context, "immediate" would mean "before the aircraft is safely on the ground". Please confirm if this is the intent.

Noted.

The usage of "immediate" is also introduced in other CS-E requirements. Particularly, CS-E 540(b) introduces the text "immediate or subsequent loss of performance", and AMC E 600 section (6) introduces "immediate response". The same interpretation should be used for this SC. For example, EASA interpretation of an immediate commanded IFSD would be when the IFSD is happening "without delay" in order not to preclude the continued safe flight and landing.

No change to the text is therefore considered necessary.

