

Proposed Equivalent Safety Finding to JAR 25.121 (d) : "Climb: One-engine inoperative"

Applicable to ERJ-170 / -190

Introductory note:

The hereby presented Equivalent Safety Finding has been classified as an important and as such shall be subject to public consultation, in accordance with EASA Management Board decision 02/04 dated 30 March 2004, Article 3 (2.) of 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."

Statement of issue

In Hot & High conditions (high altitude and temperatures) performance on ERJ 170/190 is limited by the missed approach procedures affecting landing and takeoff (through 25.1001(a)).

To reduce the limitations on such scenarios, an improved go-around performance procedure "IGAP" can be used. The IGAP consists of, when landing with flaps 5, perform the approach climb (go-around) procedure with flaps set in position 2 instead of presently used position 3.

The IGAP procedure conflicts with certification item 25.121(d) which requires that the reference stall speed for the approach climb configuration not exceed 110 percent of the reference stall speed for the related landing configuration.

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Applicant Proposal :

The stall speed ratio requirement is to ensure that an adequate margin above the stall speed in the selected approach climb configuration is maintained during flap retraction in a go-around.

An alternative means of providing an adequate operating speed margin during flap retraction in a go-around would be to increase VREF for the landing configuration to provide an equivalent operating speed margin. That is, VREF could be increased such that the reference stall speed for the approach climb configuration does not exceed 110 percent of (VREF /1.23). No change to reference stall speeds is proposed, so compliance with paragraph 25.207 (d) would be unchanged. An equivalent safety finding should be used to document the use of this alternative to comply with § 25.121(d).

Applicant Safety Equivalency Demonstration

To maintain equivalent safety :

1) The increase in VREF should not be excessive to minimize the effect on safety of longer landing distances, higher brake energy demands, and reduced margins between VREF and VFE.

2) The design approval holder is required to demonstrate that in case of dispatch or crew mixing incorrectly IGAP and non-IGAP speeds, the aircraft still have adequate margins to resume safe landing in respect to brake energy, tire speed, VFE and landing distance.

3) The design approval holder is required to demonstrate the consequences with respect of crew mixing incorrectly IGAP and non-IGAP speeds & flaps in terms of handling and performance (see table below):

| FINAL APPROACH AND LANDING SPEED | APPROACH CLIMB SPEED | APPROACH CLIMB FLAP SETTING | WAT condition |
|---|--|------------------------------------|--|
| Vref | Normal (non-IGAP) approach climb speed | IGAP Flaps setting | WAT limit for approach at normal Vref and non-IGAP flaps setting for go-around |
| Vref IGAP | IGAP approach climb speed | Non IGAP Flaps setting | WAT limit for approach at Vref IGAP and IGAP flaps setting for go-around |

In both cases above:

-safe transition from the final approach condition to the approach climb condition must be demonstrated, considering in particular handling qualities, stall and stall warning margins, and height loss

- climb gradient shortfall in the stabilized approach climb condition may not be higher than 1,1% compared to the approach climb performance published in the AFM as per JAR25.1587(b)(3)(ii)(as a consequence the steady residual climb gradient may never be less than 1.0%)

4) To minimize the possibility of human error, operators selecting the IGAP procedure should apply this consistently to the whole operators' fleet.

5) The operating procedures associated to the IGAP operation should be contained in the Airplane Flight Manual of the affected operators replacing the data for non-IGAP operation.