

Response to comments on NPA-E-40

1 - Justification of the NPA

The current JAR-E 580 (b) is the only place in JAR-E where the words “ Extremely Improbable ” appear.

After receiving advice from the JAA D&F Study Group, supported by the Helicopter group (HASG), it was concluded that these words are only relevant at the aircraft level. It is recognised that there could be “ common mode ” failure of engines which could affect simultaneously all engines on an aircraft and then lead to effects classified as catastrophic (therefore relevant to “ extremely improbable ” classification according to ACJ1 to JAR 25.1309). These failure modes would be analysed at aircraft level, not during engine certification. See JAR-E 510 and its ACJ E 510 (as in NPA-E-38) for further details.

To be consistent with JAR-E 510, at the engine level, it was proposed to replace the words “ Extremely Improbable ” by the words “ Extremely Remote ”.

For information, the current JAR-1 definition of “ Extremely Remote ” is as follows :

‘Extremely Remote’ means unlikely to occur when considering the total operational life of a number of aircraft of the type in which the engine is installed, but nevertheless, has to be regarded as being possible.

NOTE: Where numerical values are used this may normally be interpreted as a probability in the range 10^{-7} to 10^{-9} per hour of flight.

With regard to application of paragraph 21.101 (b)(3) of amendment 2 of JAR-21, this NPA is considered to have no effect on the level of safety.

2 - Economic impact analysis

It is expected that this change will have no effect on the design or certification of engines because it is consistent with the basic requirements for the safety analysis of the engine.

3 - Comments received during the circulation of the NPA

Comments were received from the following organisations :

- Authorities of Austria, Denmark, France, Germany, Malta, United Kingdom and USA
- SBAC (UK), Turboméca

4 - Response to comments

Seven commenters either accepted, or supported, or provided a “ no comment ” statement on the proposal.

One commenter, although supporting the proposal, considered that to associate “ extremely remote ” with a mechanical system was not adequate because this could not be proven. This commenter stated that JAR-E considers that this might be an acceptable assumption if some engineering judgement is made based on some “ good design ” criteria and referenced some current discussion on JAR-E 850. The commenter recommended that the ESG review this point for future change to JAR-E 580 (b) . This was agreed and registered as a future ESG action.

One commenter questioned the justification where it stated that the words “ Extremely Improbable ” are only relevant at the aircraft level. This commenter noted that there could be “ common mode ” failure of engines which could affect simultaneously all engines on an aircraft and then lead to effects classified as catastrophic (therefore relevant to “ extremely improbable ” classification according to ACJ1 to JAR 25.1309). The commenter agreed that these failure modes would be analysed at aircraft level. This comment, affecting only the justification of the NPA and not proposing changes to JAR-E, was noted. However, the wording of justification was improved.

One commenter declared that they did not understand the reasoning in the NPA that indicates that the words "Extremely Improbable" are only relevant at the aircraft level while accepting "Extremely Remote" terminology as relevant for engines under JAR-E. This commenter stated that the relevant definition for "Extremely Remote" is "unlikely to occur when considering the total operational life of a number of aircraft of the type in which the engine is installed..." and considered that the relevant definition for "Extremely Improbable" can just as easily be applied to the engine as installed in the aeroplane: "not anticipated to occur during the entire operational life of all aircraft of the type in which the engine is installed." The commenter concurred that the term "catastrophic" is not applicable at the engine level. However, this commenter considered that there is no reason that "extremely improbable" probability levels could not be applied to engine effects. Finally this commenter accepted the NPA proposal to remove the term "Extremely Improbable" from JAR-E 580.

This comment was noted. However, the ESG recognised that the severity of failure effect is linked to permitted probability of occurrence. Thus, in concurring with the proposal that the term “ catastrophic ” is not applicable at engine level, the commenter is implicitly accepting that its associated probability of “ extremely improbable ” is also not applicable. It is considered that the improved text of the justification of the NPA would address the comment and that reference to the safety analysis of JAR-E 510 and its ACJ would help to clarify the subject.