

## Response to comments on NPA-E-31

### 1 - Justification of the NPA

During the discussions on the harmonisation of some items (e.g. birds), the question of the Engine configuration to be tested has been raised : should the Engine be in full type design configuration, with all automatic protections, or should the Engine be in the minimum dispatch configuration ?

The paragraph JAR-21.33, which addresses in part the subject, specifies in JAR-21.33 (c) (2) that the Engine or parts to be tested must adequately conform to the type design.

In current JAR-E, various paragraphs were more or less related to the same subject :  
JAR-E 150 (c) (1) [*all automatic controls and protection shall be in operation...*],  
JAR-E 630 Tests general, paragraph JAR-E 630 (a) [*substantiation will normally be expected to be carried out on representative Prototype Engine...*] or  
JAR-E 630 (b) [*... tests shall be completed satisfactorily by an Engine in which the parts pertinent to the tests are identical to the Type design...*].

JAR-E 330 Tests general, in paragraph (a), refers to a single Engine for all tests, implicitly conforming to the type design.

But all these texts do not solve exactly the question for specific tests such as bird ingestion.

The Engine Study Group discussed the matter and agreed these principles : for JAR-E certification, all tests must be conducted with the Engine in the Type design configuration (or in a configuration agreed to be sufficiently representative), with automatic protections in an operational state. This allows demonstration of the Type Design's conformity with the requirements, which is the basis of the certification exercise.

In agreement with this ESG position, this NPA has been prepared for amending appropriately the JAR-E requirements. This opportunity has been used also for re-organising the various paragraphs related to tests conditions in general, as suggested by the ESG at its 29<sup>th</sup> meeting as a secondary results of the review of JAR-E during discussions of the new format (NPA-E-11). [ action listed in appendix 5 of 29<sup>th</sup> ESG meeting : "tests : to consider possibilities for deletion of some sub-paragraphs and to rationalise locations and titles..."].

This NPA has been world wide circulated for comments on 16 November 1997. This second issue of NPA-E-31 has taken into account most of the comments.

However, it should be noted that two major categories of comments on the first issue of the NPA were not fully agreed : comments related to JAR-21 and comments related to involvement of the Authority when options in the rules are being used.

### Comments related to JAR-21

Some commenters thought that some parts of the proposed JAR-E rules would be more appropriately used as interpretative material to JAR-21. It was agreed that this might be correct. Nevertheless, the Engine Study Group did not reach a consensus on the deletion from JAR-E of the commented paragraphs without a change to JAR-21 because the corresponding JAR 21.33 paragraph is not appropriately written and is therefore sometimes not consistent with current practice or is not internally consistent.

As a consequence, JAR-21 does not exactly cover the JAR-E rules as it would be necessary. In particular, JAR-21 does not address test bed and test instrumentation calibration although it seems that this is considered under a DOA.

Therefore, deletion of these requirements from JAR-E would not be compensated by JAR-21 as currently published.

Nevertheless there was another argument requesting that JAR-E be almost a stand alone document for engine certification. It is recognised that JAR-21 is governing the engine certification procedures, but it was felt necessary to make appropriate cross references to JAR-21 as a reminder for a better control of the certification process. It should be noted that some JAR-21 requirements such as JAR 21.803 (identification data), JAR 21.805 (identification of critical parts) have an effect on the engine design and should be considered as well.

### **Comments related to the involvement of the Authority when a choice is to be made.**

One commenter requested to add in many places the words "acceptable to the Authority" or "agreed by the Authority" etc. This was not accepted because in many instances decision on the acceptability of the choice may be delegated to the applicant as a privilege of its Design Organisation Approval. It appears that the commenter could be concerned by the lack of control on the applicant's decisions. It was considered that the delegation is given by the Authority itself and therefore could not be given if this Authority does not want to delegate such decisions. The ESG added words as "agreed", "acceptable", "approved" in many places with the understanding that is done by the authority or under a delegation from the authority.

This NPA-E-31 second issue was again world-wide circulated for comments after a significant revision of the proposed requirements.

## **2 - Economic impact analysis**

The changes in the proposed JAR-E 140 (a) and (b) are providing a better definition of the Engine configuration for certification testing. Other changes are also improving the editorial aspect of the JAR-E requirements which are related to general conditions for tests. This NPA is therefore mainly editorial : it is anticipated that there will be no economic impact.

### 3 - Comments received during the circulation of the NPA

Comments were received from the following organisations :

- Authorities of Denmark, France and United Kingdom
- Turboméca

### 4 - Response to comments

Two commenters either accepted or provided a « no comment » statement on the proposal.

#### General comment

One commenter noted that this NPA has been delayed for many years because of the lack of clarity of the current JAR 21.33 and considered as abnormal the fact that the JAA system has been unable to define the intent and clarify the text of JAR 21.33 for almost three years. This commenter thought that JAR-21 in that matter should be compatible with FAR 21 (which addresses conformity inspections of test articles) and with the current practice in Europe. This commenter suggested that JAR-21 should be changed to reflect the current practice of the experienced manufacturers and, because of the numerous co-operative programmes between European and US manufacturers, the rules should be equivalent on both sides of the Ocean. This comment was noted : it is understood that JAR 21.33 will now be revised.

#### Comment on JAR-E 140 (a)

One commenter suggested to delete the words “as required by JAR 21.33”. This commenter argued that this text was obviously based on the fact that JAR 21.33 would address the conformity of the test articles. Current text of 21.33 (c)(2) is not compatible with current certification practice : JAR-21 imposes to make the tests on an engine configuration fully representative of the type design. It is well known that this is impossible, at least simply because of the instrumentation installed for the tests. The deletion of the words “as required by JAR 21.33” would not solve the issue of incompatibility of JAR-E proposed rules with JAR-21 text. However, this deletion would be a means to make this difficulty less visible. This ~~was~~has been agreed.

#### Comment on JAR-E 140 (b)

One commenter requested to delete the complete ~~sub-paragraph~~sentence dealing with MMEL and to change the justification of the NPA accordingly. This commenter argued that the reference to MMEL in JAR-E 510 (e)(2) was deleted by means of NPA-E-38 (prepared and finalised after issuance of this NPA-E-31 issue 2). This ~~was~~has been agreed and the question on need for requirements on MMEL in JAR-E will be the subject of a future activity.

#### Comment on JAR-E 140 (c) and (e)

One commenter suggested to use capital letters in “Type Design” (3 occurrences) for consistency with general policy for defined words and with use of capital letters for Type Design in JAR-140 (a) of this NPA. This ~~was not~~has been agreed ~~because although~~ Type Design is not defined in JAR-1. Only JAR 21.31 defines the Type Design and this definition is acceptable. (??)

#### Comment on JAR-E 150

One commented suggested to add in JAR-E 150, a paragraph (g) to read as follows :

*(g) All test bed equipment and all measuring equipment used for tests shall be appropriately calibrated. The applicant must keep the records of the calibration available to the Authority.*

This commenter argued that this text, adapted from current JAR-E 130 (a), was proposed for incorporation into JAR 21.33. In the absence of response from the JAA system on the proposed changes to JAR-21, this requirement should be retained in JAR-E, as explained in the JAA cover letter for this world wide circulation of the NPA. This has been~~was~~ agreed in principle, except that the second sentence has been considered superfluous in JAR-E.

In addition, as a result of review of comments on NPA-E-16 (thrust reverser), JAR-E 150 (f) was reviewed and it was concluded that these requirements, specific to JAR-E 440 and JAR-E 740, would be better placed in these requirements. Therefore, they have been transferred.

#### Comment on JAR-E 300 (e)

To delete the capital letters in “Calibration Tests”. For consistency with policy on use of capital letters : this is not a JAR-1 defined wording. Also, for consistency with the proposed JAR-E 140 (d). This was agreed.

#### Comment on JAR-E 440 (a)(1)

To change the first sentence to read as follows : *(a) (1) The test shall be made in the order and in suitable non-stop parts according to the appropriate schedule*, because “Engine type” is not a defined wording. The proposed text above is simpler and sufficient for the purpose. This was agreed.

#### Comment on JAR-E 440 (a)(2)

One commenter suggested to delete the capital letters in “Endurance Test” for consistency with policy on use of capital letters : this is not a JAR-1 defined wording. And also for consistency with the proposed JAR-E 150 (f). This was agreed.

#### Comment on JAR-E 440 (a)(3)

To clarify the use of the wording “Maximum Best Economy Cruising Power”. This is not defined in JAR-1 where only “Maximum Best Economy Cruising Power Conditions” are defined. This was agreed and text changed accordingly.

#### Comment on JAR-E 440 (a)(4)

One commenter suggested to delete the capital letters in “Endurance Test”\_for consistency with policy on use of capital letters : this is not a JAR-1 defined wording. And also for consistency with the proposed JAR-E 150 (f). This was agreed.

#### Comment on JAR-E 440 (a)(5)(ii)

One commenter suggested to clarify the use of the wording “Best Economy Cruising” because it is not defined in JAR-1 where only “Maximum Best Economy Cruising Power Conditions” are defined. This was agreed and text changed accordingly.

#### Comment on JAR-E 600 (d)

One commenter suggested to delete the capital letters in “Endurance Test”\_for consistency with policy on use of capital letters : this is not a JAR-1 defined wording. And also for consistency with the proposed JAR-E 150 (f). This was agreed.

#### Comment on JAR-E 740 (b)(1)

One commenter suggested to change the first sentence to read as follows : *(b) (1) The test shall be made in the order and in suitable non-stop stages according to the appropriate schedule.* This commenter argued that “Engine type” is not a defined wording and considered that the proposed text above was simpler and sufficient for the purpose. This was agreed.

One commenter suggested to change this paragraph as follows : *(b)(1) Unless otherwise agreed, the test shall be run in the order prescribed in the schedule appropriate to the Engine type. The complete test may need to be repeated if an excessive number of stops occur.* This commenter noted that the NPA did not provide the degree of latitude allowed by the current JAR-E 740 and which has been found necessary on some engine designs and considered that the reference to running each stage non-stop was unnecessary since the second sentence covers the situation where a stop occurs. This has not been agreed. However, some flexibility has been introduced consistent with current practice.

#### Comment on JAR-E 740 (b)(3)

One commenter suggested to delete the capital letters in “Endurance Test” for consistency with policy on use of capital letters : this is not a JAR-1 defined wording. And also for consistency with the proposed JAR-E 150 (f). This was agreed.

Comment on JAR-E 890 (a)

On commenter suggested to cancel entirely the proposal (S) because this change is now superseded by NPA-E-16 which has been also world wide circulated for comments. This was agreed.

Comment on ACJ E 730

Two commenters raised the following question : in proposal (Y) heading, is the text “so that it reads as follows” a typographical error or is there a missing proposal ? As a result of the comment, paragraph (3) of ACJ E 730 was reviewed and has been found acceptable. Therefore, the proposal has been cancelled.