NOTICE OF PROPOSED AMENDMENT (NPA) NO 2008-20

DRAFT DECISION OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY

Amending Decision No. 2003/1/RM of the Executive Director of the European Aviation Safety Agency of 17 October 2003 on acceptable means of compliance and guidance material for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations ("AMC and GM to Part 21")

and

DRAFT OPINION OF THE EUROPEAN AVIATION SAFETY AGENCY,

For a Commission Regulation amending Commission Regulation (EC) No 1702/2003 of 24 September 2003, laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations

"Flight Testing"

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A. Explanatory Note

I. General

1. The purpose of this Notice of Proposed Amendment (NPA) is to envisage amending Commission Regulation (EC) No 1702/2003[1] of 24 September 2003 and Decision No. 2003/1/RM of the Executive Director of 17 October 2003[2]. The scope of this rulemaking activity is outlined in Terms of Reference MDM.003 and is described in more detail below.

2. The European Aviation Safety Agency (hereinafter referred to as the Agency) is directly involved in the rule-shaping process. It assists the Commission in its executive tasks by preparing draft regulations, and amendments thereof, for the implementation of the Basic Regulation[3] which are adopted as "Opinions" (Article 19(1)). It also adopts Certification Specifications, including Airworthiness Codes and Acceptable Means of Compliance and Guidance Material to be used in the certification process (Article 19(2)).

3. When developing rules, the Agency is bound to following a structured process as required by article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as "The Rulemaking Procedure"[4].

4. This rulemaking activity is included in the Agency's rulemaking programme for 2008.

5. The text of this NPA has been developed by the Agency based on proposals elaborated by the JAA Flight Test Working Group. This NPA has been delayed significantly for several reasons, including the need to adapt it to the EASA regulatory framework. This delay has allowed taking into account the amendment to Regulation (EC) No 1702/2003 for permit to fly and the drafting of the NPA for Implementing Rules for Pilot Licensing. This NPA is submitted for consultation of all interested parties in accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

II. Consultation

6. To achieve optimal consultation, the Agency is publishing the draft decision of the Executive Director on its Internet site. Comments should be provided within 3 months in accordance with Article 6(4) of the Rulemaking Procedure. Comments on this proposal should be submitted by one of the following methods:

CRT: Send your comments using the Comment-Response Tool (CRT) available at **http://hub.easa.europa.eu/crt/**.

E-mail: In case the use of CRT is prevented by technical problems, these should be reported to the CRT webmaster and comments sent by e-mail to NPA@easa.europa.eu.

Correspondence: If you do not have access to the Internet or e-mail, you can send your comment by mail to:
Process Support
Rulemaking Directorate

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[1] OJ L 243, 27.9.2003, p. 6. Regulation as last amended by Commission Regulation (EC) No 287/2008 of 28 March 2008 (OJ L 87, 29.3.2008, p. 3)

[2] Decision as last amended by Decision No 2007/012/R of the Executive Director of the European Aviation Safety Agency of 22 November 2007.

[3] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.03.2008, p. 1)

[4] Management Board decision concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material (Rulemaking Procedure), EASA MB/08/2007, 13.6.2007.

EASA
Postfach 10 12 53
D-50452 Cologne
Germany

Comments should be submitted by 28 November 2008. If received after this deadline they might not be taken into account.

III. Comment response document

7. All comments received in time will be responded to and incorporated in a comment response document (CRD). The CRD will be available on the Agency's website and in the Comment-Response Tool (CRT).

IV. Content of the draft opinion / decision

8. Before the transition to EASA, the JAA had set up at the request of Aerospace and Defence Industries Association of Europe (ASD, former AECMA) a working group to address the issue of flight test. The JAA proposals developed by the group contained the following items:

   - Definition of the different categories of flight tests. 4 categories were defined to reflect the different complexity levels.
   - Requirements for the competence and experience of flight test pilots and flight test engineers. The requirements depended on two parameters: complexity of the aircraft and complexity of the flight test. Such requirements contained a grandfather rule. It is important to note that the intent was not to create flight test licences.
   - Requirements for the flight test training organisations. Such requirements contained also a grandfather rule.
   - Requirements for design organisations and production organisations to have a flight test operation manual if flight testing is part of their activities. Such document should detail the necessary procedures for an organisation to perform flight tests. It has a comparable purpose to the operations manual required for commercial air transport operators. Documenting such procedures will improve safety.
   - Privileges for DOA in relation with permit to fly.
   - Simplified requirements to obtain a type rating when the flight test pilot participated in the development of the type rating syllabus for an aircraft which has been tested. The concept developed by the JAA aimed at introducing a cross-reference in JAR-FCL 1.230 (special authorisation of type or class rating) indicating that the requirements to obtain such authorisation could be found in Part-21.

9. The transposition of such elements into the EASA regulatory framework took into account the following considerations:

   - Flight tests are usually conducted on aircraft that fly under a permit to fly.
   - The scope of the Agency has been extended to operations, pilot licensing and third countries aircraft by the new Basic Regulation (Regulation (EC) 216/2008).

As a consequence, the legal basis for the requirements for flight test crew has received significant consideration. Two legal bases have been used: one for the pilots engaged in categories 1 and 2 of flight testing; and another one for the flight test engineers and for the pilots engaged in categories 3 and 4 of flight testing. This difference in the legal basis can be justified by the different nature of the qualifications as well as by the scope of Community competence.

In the case of pilots engaged in categories 1 and 2 of flight testing, it was considered that it would be beneficial to take advantage of the extension of Community competence to pilot licensing and to link the pilot's qualification to his/her licence. The main reason for this was

that the training required is not specific to the organisation for which the pilot works. Since this training is general and related to the category of flight test that the pilot wishes to perform, it was considered that this qualification should follow a similar regime to other qualifications in JAR-FCL for specific types of activity, meaning that the pilot will undertake the course of training at an approved training organisation with privileges to conduct flight test instruction and that once the applicant meets the requirements in the rules he/she will have this qualification endorsed on the licence, which will allow him/her the benefits of mutual recognition.

The relevant requirements for the pilots may be found in Subpart I (additional ratings) of Part-FCL as envisaged by NPA 2008-17b[5]. The corresponding requirements for flight test training organisations will be included in the NPA relative to Management Systems for organisations that will be published for consultation soon.

However, in the case of pilots conducting fight tests of categories 3 and 4 it was considered that a different regime should be applied. The training necessary for these categories of flight tests is specific to the organisation for which the pilots work, since it takes into account their specific procedures. This means that a pilot who has received training in one organisation to conduct this kind of flight tests will not be automatically qualified to conduct the same tests for another organisation. Therefore, the qualification to perform these flight tests should not be linked to the pilot's licence or be subject to mutual recognition. For this reason, a different legal basis had to be found in order to introduce requirements for pilots conducting this type of flight test.

Furthermore, in the case of flight test engineers it was not possible to use the same legal basis, since the scope of community competence is, for the moment, limited to the licensing of only two categories of aviation personnel: maintenance engineers (Part-66) and pilots (Part-FCL). It was considered therefore that the regime applicable to flight test engineers should be similar to the one applicable to pilots conducting flight tests of categories 3 and 4.

The legal basis for flight test engineers and for the pilots engaged into categories 3 and 4 of flight testing can, therefore, be found in the requirements relative to permit to fly. As test flights are performed under a permit to fly, the legal basis for regulating the qualification of flight crew is in article 5(5)(e)(ii) of the Basic Regulation. As a consequence, the qualifications for flight test engineers are now related to the new Subpart P to Part-21 recently adopted by the European Commission (see Commission Regulation (EC) No 287/2008 of 28 March 2008). It includes notably the possibility for appropriately approved Design and Production Organisations to issue permits to fly. Paragraph 21A.708 deals with the establishment of flight conditions, and these include the conditions and restrictions imposed on the flight crew members and their qualification to fly the aircraft. A specific Appendix 1 to this paragraph has been created for that purpose.

10. In line with the above, this NPA contains the following elements:

    - Definition of categories of flight testing: substantially as in the JAA proposals;
    - Definition of the necessary competence and experience for flight test engineers and for the pilots engaged into categories 3 and 4 of flight testing: based on the JAA proposals. The objectives are equal treatment and safety.
    - Requirement for the development of a flight test operation manual: substantially as in the JAA proposals. The objective here is safety.

11. The privileges for issuing permit to fly for approved design organisations (DOA) and approved production organisations (POA) have been introduced in the new Subpart I of Part-21.

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[5] NPA 2008-17b may be found at: http://www.easa.europa.eu/ws_prod/r/r_npa.php

12. The requirements for the flight test operations manual have been introduced in Subpart G (Production Organisation Approval) and into Subpart J (Design Organisation Approval). The requirement to develop a flight test operations manual is considered related to the organisation's approval requirements. The contents of the flight test operations manual are detailed in an AMC which takes into account the concept of the flight conditions introduced by the new Subpart I to Part-21.

13. Definitions for the different categories of flight tests have also been developed. They are necessary to establish the competences for the crew. The definitions for flight testing have been incorporated into the Appendix XII.

14. The table below provides a cross-reference between the main items of the JAA proposal and the EASA framework:

JAA proposal	**EASA framework**
Definition of the different categories of flight tests.	This NPA envisages their introduction into Part-21.
Requirements for the qualifications/ competences of flight test pilots and flight test engineers.	Qualifications/competences for pilots performing category 1 and 2 tests: included in NPA 2008-17 creating Part-FCL. Grandfather rule: will be included in the cover regulation for Part-FCL. Qualification/competences for flight test engineers and pilots performing category 3 and 4 tests: included in this NPA. Grandfather rule: included in this NPA.
Requirements for the Flight Test Training Organisations.	To be included in the NPA on Part-Management Systems to be published for public consultation by the end of August.
Requirements for Design Organisations and Production Organisations to have a flight test operation manual if flight test is required by their activities.	Included in this NPA.
Privileges for DOA in relation with permit to fly.	Already included in Part-21 (Subpart P).
Simplified requirements to obtain a type rating when the flight test pilot participated in the development of the type rating syllabus for an aircraft they have tested.	Not envisaged at this stage. The material received from the JAA Working Group was not sufficient to develop a detailed proposal: it lacked detailed criteria and was too open to interpretation, not ensuring the necessary legal certainty. Furthermore, the Agency considers that it might be more adequate to deal with concrete cases individually, by making use of the safeguard clause of Article 14 of the Basic Regulation. However, if during the consultation of this NPA or NPA 2008-17 detailed proposals complete with a detailed criteria describing how the evaluation should be done are received, the Agency would consider incorporating them into Part-FCL, or to create a new rulemaking task dedicated to this issue.

15. The detailed explanations below are relative to this NPA.

The 4 categories of flight tests:

Flight tests have been classified in 4 categories. No names have been given to the categories, as it was difficult to find names that would appropriately reflect the contents of each category. However, category 1 could be loosely defined as 'experimental flight test', category 2 as 'engineering flight test', and category 3 as 'production flight test'. Category 4 deserves a special mention: it corresponds to flights that are done to show compliance to the certification basis but do not require special qualifications for the crew. The content of this category has been extensively discussed within the JAA Working Group. It was suggested, mostly by the operating industry, that the envisaged wording is too restrictive. The Agency has, however, concurred with the majority view of the JAA Working Group, which is reflected in the present NPA.

16. Competences and experience for pilots engaged into category 1 and 2 of flight tests **(Not included in this NPA, please refer to NPA 2008-17):**

Category 1 and 2 are the most technically demanding categories of flight test. As a consequence, the NPA 2008-17 on Part-FCL requires that pilots follow a training course at an approved training organisation if they intend to participate in tests for the certification to CS-25, CS-23, CS-27 and CS-29 or equivalent airworthiness codes. The requirements for such organisations will be included in the NPA for Part Management Systems that should be issued soon. The approval process will be the same as for other flight training requirements. This means that the existing schools that provide training for flight test will need to obtain such approval.

For other categories (e.g., aircraft certificated on the basis of CS-22, CS-VLA and CS-VLR), the manufacturer will propose the competence and experience that is considered appropriate for the envisaged flight or series of flight. This competence and experience will be approved by the Agency as part of the approval of the flight conditions.

17. Competences and experience for flight test engineers and for the pilots engaged into categories 3 and 4 of flight testing:

Such competences and experience have only been established for certain categories of aircraft: those certificated on the basis of CS-25, CS-23, CS-29 and CS-27. As CS-23 covers aeroplanes with very different performances, it has been subdivided into CS-23 Jets, CS-23 Commuter and other CS-23. For other categories (e.g. aircraft certificated on the basis of CS-22, CS-VLA and CS-VLR), the manufacturer will propose the competence and experience that is considered appropriate for the envisaged flight or series of flight. This competence and experience will be approved by the Agency as part of the approval of the flight conditions.

The competences and experience depend of the nature of the test and the complexity of the aircraft being tested: the more complex the test and the aircraft are, the higher the qualifications should be.

A grandfather rule has been defined in order to avoid disruption of activities: it allows flight test crew participating in flight test activities at or before the entry into force of this amendment to Part-21 to continue to exercise their present scope of functions. The entry into force of this amendment is planned to occur 18 months after the publication of the amendment. However, flight test crew that would like to extend the scope of the qualification will have to comply with the qualification requirements described in Part-21. Consistent with the principle adopted for other transition measures, this grandfather rule is included in Commission Regulation (EC) No 1702/2003 and not in Part-21.

18. The flight test operations manual:

This document is comparable to the operations manual required for operators in commercial air transportation. It formalises existing practices and provides a reference for flight test activities. It may be combined with the DOA handbook or Production Organisation Exposition (POE).

It allows the recording of relevant policies of the organisation relating to flight tests, and in particular to the carriage of passengers and technicians. It places emphasis on the flight test programme and its associated documents.

V. Regulatory Impact Assessment

19. Introduction and content of the RIA

The attached RIA was prepared for the JAA: Although drafted in a JAA context in 2003, the attached Regulatory Impact Assessment (RIA) for flight testing provides useful information on the rationale for the flight test proposals. It has been updated to take into account more recent information and adapted to this NPA. The elements included into the JAA proposal have been now reflected into three different NPAs: this NPA, NPA 2008-17 and the incoming NPA for Part-Management Systems. This RIA is also intended to support the two other NPAs.

Regulatory Impact Assessment for NPAs Covering Flight Test Issues

20. Introduction:

This RIA was started under the JAA process and takes into account comments received in the JAA system, mostly from the Regulation Sectorial Team and from the JAA Flight Test Working Group that was involved in this work in the last quarter of 2003.

It covers the NPAs for Part-21, Part-FCL and Part-MS and uses the word 'the NPA' as a writing convention to address all of them.

21. Methodology to conduct the Regulatory Impact Assessment:

The methodology used for this RIA is the one proposed by JAA NPA 11-2 Regulatory Impact Assessment. The following paragraphs/subparagraphs are organised in accordance with the ACJ that was proposed by JAA NPA 11-2. This methodology is very close to the EASA methodology for RIA and, therefore, the format has not been modified.

22. Purpose and Intended Effect:

a. Issue which the NPA is intended to address:

Harmonisation of flight test crew qualifications is the main purpose of this NPA.

b. Scale of the issue (quantified if possible):

Flight test crews are a small community (several hundred people) compared to the general pilot population. However, the flight testing activity is fundamental for certification. E.g., flight test crews play a key role in the assessment of handling qualities of aircraft and of the man-machine interfaces.

c. Who and/or what is affected:

Obviously, flight test crews are affected.

The flight testing activities of aircraft manufacturers, engine manufacturers, systems and equipment manufacturers, operators' engineering departments will be affected. Actually, the activities of any design organisation that uses flight testing as a means of compliance to certification requirements will be affected.

It should be noted that the proposed rules will only affect flight testing for development and certification purposes. Flight testing for other purposes (e.g. research) will not be affected by this NPA. The Agency may consider regulating flight testing for other purposes than certification at a later stage.

d. Brief statement of the objective of the NPA (such as a safety improvement):

The NPA was developed to harmonise, in Europe, flight test crew qualifications, in answer to a request from industry (ASD, former AECMA). ASD had experienced a number of cases where test crews qualified in one country were not recognised in other countries.

The NPA proposes requirements for approval of flight test training organisation.
The NPA will contribute to the free circulation of persons (flight test crews) and services (flight testing activities) and will also improve safety, in particular by requiring the development by the applicants (e.g. aircraft manufacturers) of a flight test operations manual approved by the competent authority.

23. Options:

23.1 Options evaluated and identified. 2 options were envisaged:

a. Do nothing:
This option would have avoided the resources and expenses related to the NPA process (set up a group to draft the NPA, review comments, prepare final draft rules and comment response documents, circulate the NPA for comments). However, this option would not have solved the issue raised by industry.

b. Proceed with the NPA:

The NPA will address:

- *The definitions relative to Flight Testing*

The purpose of these definitions is to identify the different categories of flight tests associated to different competence and experience for flight test crews and to clearly separate flight tests from check flights (e.g. performed after maintenance). The difference between them can be described as follows:

Flight tests may be broadly defined as flights necessary during the development phase of a new design (aircraft, engine, parts and appliances) to show compliance to certification requirements. Therefore, during such flights there is a certain amount of “unpredictability”, which does not happen in the case of check flights and acceptance flights.

Maintenance activities should only use approved data. Therefore, flights performed after maintenance should be for the purpose of performing checks. Such checks are performed by flight crews in accordance with EU-OPS and national rules implementing JAR-OPS 3 and JAR-FCL.

- The requirements for *flight test crew experience and competence* (including grandfather rules).

- The requirements for flight test training organisations.

- The requirements relative to the *flight test operations manual*.

It should be noted that this NPA is only applicable to CS-23, CS-25, CS-27 and CS-29 aircraft.

23.2 Equity and fairness issues identified:

The following issue was identified: the applicability of the proposed flight testing requirements to small organisations. To avoid creating an undue burden on industry, CS-22, CS-VLA and CS-VLR aircraft have been excluded from the proposed EASA requirements. Such aircraft are usually developed by small organisations.

23.3 The selected option:

Please see paragraph 26 of this RIA.

24. Impacts:

24.1. Sectors affected:

The sectors affected may be listed as follows:

- CS-23, CS-25, CS-27, CS-29 aircraft manufacturers: an estimate of their number world-wide amounts to: 40 manufacturers of CS-23 aircraft; 15 type certificate holders of CS-25 aircraft; 10 manufacturers of CS-27/29 aircraft.
- Engine manufacturers for such aircraft: an estimate of the number of such manufacturers world-wide amounts to 15.
- STC holders/or applicants for such aircraft: the number of such organisations that could use flight test as a means of establishing compliance with the regulations can be estimated between 50 and 100 in Europe.
- Civil flight test crews: their number can be evaluated to several hundreds world-wide with approximately 150 working in EASA Member States.
- Existing flight test training organisations: there are five existing schools which have international standing and/or recognition, three in the US and two in Europe.

24.2. All impacts identified:

a. Safety:

i. Evaluation of current safety of flight testing activities:

A review of accidents during flight test activities from 1990 onwards has been performed for fixed-wing aircraft and for rotorcraft.

Fixed-wing aircraft:

The review has been done using the Word Airline Accident Summary (WAAS - Civil Air Publication 479 maintained by AIRCLAIMS) completed by several websites resources (e.g. Aviation Safety Network; NTSB; FAA NASDAC).

The search criteria were aircraft operated by manufacturers (or organisations performing flight tests) during test, demonstration or acceptance flights.

Note: Experimental and development were considered as test.

30 accidents were found during the period between 1990 and 2005, leading to 53 fatalities.

There was not much information available that would help evaluating the proposals contained in the NPA. However, the following points are worth of note:

- In one accident it was noted that formal risk management had not been used. This relates to the statement to be made in the flight order relative to the conclusion of a formal hazard assessment.
- Two of the preliminary recommendations of another accident were relative to the crew composition/presence of passengers on board and to the preparation of test flights. This relates to the contents of the flight test operations manual (Flight Test Aircrew: company policy relative to the composition and competence of minimum crew; Transport of technician and passengers).
- The probable cause of another accident reads as follows: '*captain's failure to follow the agreed test plan and the co-pilot's failure to ensure that the anti-spin parachute was attached before deployment.'* Following the agreed test plan is related to the flight test order required by the flight test manual. The synopsis of the accident also discusses safety equipment and

hazard assessment of the test. These two issues are addressed by the flight test operations manual proposed by this NPA.

- A contributing factor in another accident was "*the flight crew lack of engineering flight test training"*. This is related to the proposed conditions for crew competence and experience included in this NPA.
- In another accident the pre-flight briefing and the flight cards used for the test manoeuvres were found inadequate. This relates to the flight test order.
- The probable cause of another accident was determined to be: '*inadequate flight test methods by the manufacturer and the FAA which did not permit safe operating clearances'*.

Rotorcraft:

Similar to fixed-wing aircraft, the review has been done using the Word Airline Accident Summary (WAAS - Civil Air Publication 479 maintained by AIRCLAIMS) completed by several websites resources (e.g. Aviation Safety Network; NTSB; FAA NASDAC).
The search criteria were aircraft operated by manufacturers (or organisations performing flight tests) during test; demonstration or acceptance flights.
Note: Experimental and development were considered as test.
15 accidents were found during the period between 1990 and 2005, leading to 9 fatalities.
There was not much information available that would help evaluating the proposals contained in this NPA. However, the following point is worth of note:

- In one accident the probable cause was defined as follows: '*failure of the manufacturer to follow its directive to develop corrective measures in response to known accident data, and their failure to ensure that pertinent information (in engineering department) was communicated to the test pilot and flight engineer (in test flight)'.* This is related to the requirement in the paragraph 'company organisation' of the flight test operations manual, according to which the co-ordination between departments affecting flight test, e.g. design office, maintenance, etc., should be described.

The above supports the case for a flight test operations manual.

ii. Evaluation of the safety benefit of the NPA:

The above analysis supports the need for appropriate requirements for flight test crew competence and experience. In the light of the above, requiring a flight test operations manual to be approved by the competent authority is seen as a significant safety improvement.

The purpose of the flight test operations manual may be compared to the purpose of the operations manual for commercial air transport operators.

The importance of the following provisions of the flight test operations manual has been highlighted by the above reviews of accidents:

- Company organisation: co-ordination between departments involved in flight testing,
- Policy relative to formal hazard assessment,
- Policy relative to crew composition and competence,
- Policy relative to the presence on board of technicians and any passengers,
- Safety equipments,
- Flight test order.

b. Economic considerations:

i. The experience and competence of flight test crews are related to the complexity of the test and the complexity of the aircraft. The basic idea was to avoid "one shoe for all sizes". 4 cases have been envisaged and were found adequate to cover the range of flight tests and the range of aircraft under consideration.

1. Flight test engineers must have satisfactorily completed a training course approved by the Agency. Flight test pilot must have satisfactorily completed a training course at an approved training organisation appropriate to the intended aircraft and category of flights.

This requirement is limited to CS-25 aircraft, to jet airplanes certified to CS-23, to CS-23 Commuter Category, to CS-27 and CS-29 rotorcraft. The application of such condition to CS-27 rotorcraft was questioned, but the Agency concluded that it was reasonable due to the specificities of this rotorcraft category (7 of the rotorcraft accidents occurred to FAR/CS-27 rotorcraft).

Training courses corresponding to condition 1 usually cover performance, handling qualities, systems and test management and can be outlined as follows:

- For fixed-wing test pilots: duration 10 months; 500 hours of ground training; 110/120 flying hours on 15/25 different airplanes.

- For rotorcraft test pilots: duration 10 months; 500 hours of ground training; 110/120 flying hours on 4 to 10 rotorcraft.

- BSc or equivalent university education is usually requested from applicants.

Such training courses represent a significant investment.

These training courses for pilots will have to be completed at approved training organisations.

Existing organisation will need to get such an approval and this will induce costs:

- Fees and charges to obtain the certificates and possible modifications of procedures and manuals. Maintaining such approvals will also generate costs (e.g. costs of audits).

2. *The flight test engineer must have gained a significant amount of flight experience relevant for the task, and must have been trained for flight testing activities. Flight test pilot must have satisfactorily completed a training course at an approved training organisation appropriate to the intended aircraft and category of flights.*

In the case of flight test engineers, this requires a significant amount of flight experience, in accordance to the task, as well as training for flight testing activities. The words ‘relevant tasks’ have been added to indicate, e.g., that to do category 1 testing on other CS-23 aircraft, a flight experience on such machines is more useful than an experience on a four-engine jet. For condition 2, the requirement for training leaves quite an amount of flexibility how to do it: for example, it could be in-house training.

Due to this flexibility, it is not easy to evaluate the necessary investment. An upper ceiling for the investment can be measured by what is usually called short courses. An example of such short courses lasts 15 weeks and the flying training amounts to 38 hours on 12 types of airplanes.

When such training is provided in-house (if the organisation has been approved to conduct flight test courses in accordance with Part-Management

Systems) in the case of large aeroplanes, ground training may be provided by members of the company as part of their job and flight training may be provided during real test flights. The trainee is added to the normal flight test crew. Doing flight training in such a way has a minimal cost: the main consequence is to add a little more flight time to the flight test.

In the case of pilots, the situation is similar to the case 1.

3. Flight crew members must:

- *have gained a significant amount of flight experience relevant for the task; and*
- *have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness; or*
- *in the case of single-pilot aircraft have received a detailed briefing on the flight test to be performed; and*
- *in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL.*

This requires a significant amount of flight experience, in accordance to the task and either participation in a certain number of flights (5) or a detailed briefing (for single seat aircraft).

The idea was to provide hands-on training. 5 flights were considered to be a reasonable and adequate number. The important point is that the pilot has participated in all flights "up to the issuance of their individual certificate of airworthiness". The idea is to cover a complete package of flights.

In this case, the cost amounts to the participation in these 5 flights. They are real category 3 flights and are not done for the purpose of training only.

4. Flight crew members must:

- *have been appointed by the organisation performing the flight test; and*
- *have been informed on the change to type design for which the flight tests is to be undertaken; and*
- *in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL.*

This allows for the use of commercial or airline pilots provided that they have been selected by the organisation and have been informed of the change of design. Such an approach was found acceptable because of limited scope of category 4 flight tests.

In this case, the necessary investment is very limited. It is limited to performing the selection process; documenting it and providing the necessary briefings (several hours for each flight should suffice).

ii. The concept of category 4 flights deserves more detailed explanations to better understand its impact:

Category 4 has been introduced to cover all less demanding test flights which would not fit into categories 1 to 3. There is a different qualification level for the flight crew involved in these tests. Such flights may be conducted by the same kind of pilots undertaking acceptance flights of newly delivered airplanes or flights after overhaul, essentially experienced line pilots.

According to AEA’s opinion, flights covered by category 4 could also include those required by a DOA to show compliance with airworthiness requirements of "not yet approved data" after a typical airline/MRO design change, e.g.,

cabin conversion, zonal drying system installation, emergency locator transmission (ELT) installation, cabin aircraft location pictorial system installation, new entertainment system installation, SATCOM and telephone installation, etc. The majority of these flights are conducted to check Electromagnetic Interferences only. The pilots do not require formal test pilot training, since in-flight assessments are not required and the aircraft is not flown outside the airplane published flight envelope.

The general consensus is, however, to treat installations of EGPWS and TCAS as falling under category 2 and the majority vote in the JAA Working Group has determined that these specific installations warrant higher than category 4. The Agency concurs with this majority view.

iii. Also, the requirements for flight testing are not intended to be applicable to check flights. In co-ordination with maintenance colleagues, a clear distinction has been made between test flights and check flights: the word test was used in the past to cover two kinds of flight. Due to the requirements on flight testing introduced by this NPA, it was necessary to make the distinction in order to avoid unreasonably burdening industry.

iv. Grandfather rules have been developed for existing tests crews and training schools. The purpose of the grandfather rule for crews is to allow them to continue their present scope of activities, unless they intend to change that scope.

v. Mandating a flight test operations manual is considered to be a significant safety improvement. However, the Flight Test Working Group has tried to avoid being over-prescriptive including its contents in an AMC: e.g., in relation to aircrews and transport of technicians and passengers, the only provision is to mention the description of the company policy. Contents are based on those of existing flight test operations manuals of European manufacturers.

Best practices may be used to develop flight test operations manuals. Examples of best practices relative to flight test safety can be found on the website of the Flight Test Safety Committee. This Committee was formed jointly by members of the Society of Experimental Test Pilots (SETP), the Society of Flight Test Engineers (SFTE) and the American Institute of Aeronautics and Astronautics (AIAA).

Depending of the size of the company, the manual may be a separate document or be included in other documents.

c. Harmonisation:

The flight test requirement of Part-21 applies only to EU manufacturers.

d. Environmental Considerations:

Not applicable.

e. Social Considerations:

The NPA is intended to facilitate free circulation of flight test crews by harmonising requirements relative to their qualifications and experience. Grandfather rules have been developed (see paragraph 24.2.b.iv): they can be seen as a mitigation of possible negative social impacts.

25. Consultation:

In the JAA context, Sectorial Teams have been consulted. Such consultation provided some information on economic impact (in particular in relation with impact on manufacturers of general aviation aircraft).

There has been no specific consultation of the RIA in the EASA context.

26. Summary and Final assessment:

Two options have been described and reviewed in paragraph 23.1:

- Do nothing.
- Proceed with the NPA.

Organisations and people affected by the Flight Test NPA have been listed in paragraph 24.1:

- Civil flight test crews.
- Organisations designing CS-23, CS-25, CS-27 and CS-29 aircraft or designing modifications affecting such aircraft.
- Existing flight test training organisations.

Impact on safety has been evaluated in paragraph 24.2.a and is based on two reviews of accidents (one for fixed-wing aircraft; one for rotorcraft).

Economic impact on industry has been qualitatively evaluated in paragraph 24.2.b. The following mitigations of impact on industry have been proposed:

- Applicability should be limited to CS-23, CS-25, CS-27 and CS-29 aircraft.
- Grandfather clause.
- Experience and competence of flight test crew is dependant of the complexity of the test and of the aircraft under test.

Impact on harmonisation with FAA and other authorities has been evaluated in paragraph 24.2.c.

Environmental impact has been found not applicable in the case of flight testing activities.

Social considerations are included in paragraph 24.2.e. The grandfather rules for crews are considered a mitigation factor.

Proceeding with the NPA has been chosen as the preferred option as described in paragraph 23.3.

B. Draft Opinion

The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

1. deleted text is shown with a strike through: ~~deleted~~
2. new text is highlighted with grey shading: new
3. ….

   indicates that remaining text is unchanged in front of or following the reflected amendment.

I. Amendments to Regulation (EC) No 1702/2003

Insert new article 2f:

Article 2f

Competence and experience of flight crews participating in flight test activities

(a) The competence and experience requirements established in Appendix XII to Part-21 shall become applicable 18 months following publication of this amendment to Part-21.

(b) Flight crew members participating in flight test activities at the date of entry into force of this Regulation shall be considered as having complied with the relevant requirements of Appendix XII to Part-21 and may continue to exercise their present scope of functions. Any changes to the scope of their functions shall comply with the requirements of Appendix XII to Part-21.

II. Amendments to Part-21

Part-21 is amended as follows:

1. Contents (detailed layout)

The text of Contents (detailed layout) is amended as follows:

….

Appendices ~~– EASA Forms~~ ……59

…

SECTION A

Subpart G – PRODUCTION ORGANISATION APPROVAL

2. Paragraph 21A.143, Exposition is amended as follows:

In paragraph (a), a new subparagraph 13 is added:

……

13. A flight test operations manual recording significant organisation's policies relative to flight test must be furnished if flight testing is to be conducted.

….

SUBPART J — DESIGN ORGANISATION APPROVAL

3. Paragraph 21A.243, Data is amended as follows:

The following text is added to paragraph (a):

….

(a) The design organisation shall furnish a handbook to the Agency describing, directly or by cross-reference, the organisation, the relevant procedures and the products or changes to products to be changed. A flight test operations manual recording significant organisation's policies relative to flight testing must be furnished if flight test is to be conducted.

….

SUBPART P - PERMIT TO FLY

4. Paragraph 21A.708, Flight conditions is amended as follows:

The following text is added to paragraph (b) 2:

….

1. the conditions and restrictions put on the flight crew to fly the aircraft. Flight crews involved in flight tests shall comply with the conditions defined in Appendix XII to this Part.

….

5. Add a new Appendix XII, Competence and experience of flight test engineers and of pilots engaged in categories 3 and 4 of flight testing

(a) General:

This Appendix contains the qualifications of flight crew involved in the conduct of flight tests for aircraft certified in accordance with CS-23, CS-25, CS-27 or CS-29.

(b) Categories of flight tests

Flight tests include the following four categories:

(1) Category One

- Initial flight(s) of a new type of aircraft or of an aircraft of which flight and/or piloting characteristics may have been significantly modified.
- Flights to investigate novel or unusual aircraft design features or techniques.
- Flights to determine or expand the flight envelope.
- Flights to determine the regulatory performances, flight characteristics and handling qualities in extreme conditions.

(2) Category Two

- Flights done in the part of the flight envelope already opened and comprising manoeuvres, during which it is not envisaged to encounter flight and/or handling characteristics (performance and flying qualities) significantly different from those already known.
- Display flights and demonstration flights of a non-type-certificated aircraft.
- Flights conducted for the purpose of determining whether there is reasonable assurance that the aircraft, its parts and appliances are reliable and function properly.

(3) Category Three

- Flights performed prior to issuance of an individual certificate of airworthiness in order to establish the conformity of the relevant aircraft production to the approved type design.

(4) Category Four

- Flights performed after embodiment of a new not yet approved design change which does not need an assessment of the general behaviour of the aircraft and/or the impact on crew procedures when the new or modified system is operating.

(c) Competence and experience of flight crews:

(1) Pilots involved in flight tests of categories 1 and 2 shall comply with the condition established in Part-FCL.

(2) Competence and experience of flight test engineers and of pilots engaged into categories 3 and 4 of flight testing.

A test pilot engaged in categories 3 and 4 of flight testing must hold a valid pilot licence appropriate to the category of aircraft under test issued in accordance with Part-FCL.

A flight test engineer must be suitably qualified and, if his/her tasks include flying, medically fit, for the tasks performed, in accordance with national regulations.

Such flight crew members must have the competence and experience specified in the table hereunder:

Categories of flight tests / Aircraft categories	CAT 1	CAT 2	CAT 3	CAT 4
CS-25, CS-23 jets and CS-23 Commuters	The flight test engineer must - have satisfactorily completed a specific training course accepted by the Agency.	The flight test engineer must - have gained a significant amount of flight experience relevant for the task, and must have been trained for flight testing activities.	Flight crew members must: - have gained a significant amount of flight experience relevant to the task; and - have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness; or - in the case of single-pilot aircraft- have received a detailed briefing on the flight test to be performed; and - in the case of pilots, hold the	Flight crew members must: - have been appointed by the organisation performing the flight test; and - have been informed on the change to type design for which the flight tests is to be undertaken; and - in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL.

Categories of flight tests Aircraft categories	CAT 1	CAT 2	CAT 3	CAT 4
			relevant type or class rating issued in accordance with Part-FCL.	
Other CS-23	The flight test engineer must - have gained a significant amount of flight experience relevant for the task, and must have been trained for flight testing activities.	The flight test engineer must - have gained a significant amount of flight experience relevant for the task, and must have been trained for flight testing activities.	Flight crew members must: - have gained a significant amount of flight experience relevant for the task; and - have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness; or - in the case of single-pilot aircraft have received a detailed briefing on the flight test to be performed; and - in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL.	Flight crew members must: - have been appointed by the organisation performing the flight test; and - have been informed of the change to type design for which the flight tests are to be undertaken; and - in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL.
CS-27	The flight test engineer must - have satisfactorily completed a specific training course accepted by the Agency.	The flight test engineer must - have gained a significant amount of flight experience relevant for the task, and must have been trained for flight testing	Flight crew members must: - have gained a significant amount of flight experience relevant for the task; and - have participated in all flights on at	Flight crew members must: - have been appointed by the organisation performing the flight test; and - have been informed of the change to type design for which

Categories of flight tests Aircraft categories	CAT 1	CAT 2	CAT 3	CAT 4
		activities.	least five aircraft up to the issuance of their individual certificate of airworthiness; or - in the case of single-pilot aircraft have received a detailed briefing on the flight test to be performed; and - in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL.	the flight tests are to be undertaken; and - in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL.
CS-29	The flight test engineer must - have satisfactorily completed a specific training course accepted by the Agency.	The flight test engineer must - have gained a significant amount of flight experience relevant for the task, and must have been trained for flight testing activities.	Flight crew members must: - have gained a significant amount of flight experience relevant for the task; and - have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness; or - in the case of single-pilot aircraft have received a detailed briefing on the flight test to be performed; and - in the case of pilots, hold the	Flight crew members must: - have been appointed by the organisation performing the flight test; and - have been informed of the change to type design for which the flight tests are to be undertaken; and - in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL.

Categories of flight tests Aircraft categories	CAT 1	CAT 2	CAT 3	CAT 4
			relevant type or class rating issued in accordance with Part-FCL.	

C. Draft Decision

I. AMC to paragraphs 21A.139, 21A.243 and to 21A.14(b), 21A.112B(b) and 21A.432B(b)

Create a new AMC to paragraphs 21A.139, 21A.243 and to 21A.14(b), 21A.112B(b) and 21A.432B(b)

The following AMC is inserted:

AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b)

Flight Test Operations Manual (FTOM)

1. The FTOM may be included in the DOA handbook (or in the manual of procedures when the alternative to DOA is acceptable) or in the Production Organisation Exposition, or it may be a separate manual referred to in those documents, as appropriate.
2. The FTOM should contain the elements listed in (a) to (k):

(a) Exposition (Not applicable in the case of alternative procedures for DOA):

If the FTOM is presented as a separate document, it should present a chart indicating the exposition of the organisation and, more specifically, the functional links for the people in charge of FT activities. It should also mention the co-ordination between departments affecting FT, e.g. Design Office, Maintenance.

(b) Formal hazard assessment:

The FTOM should describe the organisation's policy relative to formal hazard assessment and associated methodologies, in particular identifying circumstances when a formal hazard assessment is not considered necessary.

(c) Flight test air crew:

According to the category of test, the FTOM should describe the organisation's policy relative to composition and competence of the minimum crew. The policy must comply with the requirements contained in Appendix XII to Part-21. The role of flight test air crew in relation with the demonstration of compliance with the applicable certification specifications or environmental protection requirements should be described. The policy should include the specific project-related training programmes required for the various categories of flights.

(d) Transport of technicians and passengers:

According to the category of test, the FTOM should describe the organisation's policy relative to the presence on-board of technicians and any passengers.

(e) Flight test instrumentation and data processing:

The FTOM should describe specific instrumentation applicable to various types of flights and the procedure for data processing within the organisation.

(f) Safety Equipment:

The FTOM should list, depending on the nature of the flight, the specific safety equipment which must be available: e.g., emergency exits, parachute, oxygen masks.

(g) Weather minima:

The weather minima for test flights should be defined dependant upon the category of flight test and the status of development of the aircraft and its systems.

(h) Documents:

The FTOM should list the documents to be produced for flight testing:

(i) Documents Associated with a Flight Test Programme

- General Flight Test Programme
- Flight Order for a given flight including:
  - Listing of the tests to be performed and associated conditions
  - Category of the flight (e.g. category 1)
  - Composition of aircrew
  - Names of technicians or any passengers
  - Loading of the aircraft
  - Reference to approved flight conditions
- Flight crew report

(ii) Documentation required on board during flight testing

(i) Permit to fly:

The FTOM should include the procedures related to the approval of the flight conditions and issue of permits to fly, in accordance with Subpart P or make reference as relevant to DOA or POA procedures. The flight conditions presented to EASA approval before the first flight of a new aircraft may include information on the management of changes between and during flights, together with the justifications demonstrating the safety of the flight under such circumstances. Such flight conditions would allow the performance of a series of flights without requiring re-approval by EASA.

(j) Definition of production flight test programme:

The design approval holder should define the flight test programme needed for flights performed prior to issuance of an individual certificate of airworthiness in order to establish the conformity of the relevant production aircraft to the approved type design. This programme is part of the flight conditions defined in 21A.708(b), to be approved by EASA or under the DOA privilege of 21A.263(c)(6).

(k) Demonstration flights:

The FTOM should include the procedure to conduct demonstration flights with aircraft flying under a permit to fly.

II. GM to Appendix XII to Part-21

Create a new GM to Appendix XII to Part-21

The following GM is inserted:

GM to Appendix XII to Part-21

Competence and experience of flight test engineers and of pilots engaged in categories 3 and 4 of flight testing

1. Categories of flight test:

The examples proposed below are intended to clarify the boundary between category 2 and category 4 flight tests.

Category 2 flight tests: examples of such flights are:
- EGPWS and TCAS

Category 4 flight tests: examples of such flights are:

Those required by a DOA to show compliance with airworthiness requirements of "not yet approved data" after a typical airline/MRO design change, e.g. cabin conversion, zonal drying system installation, Emergency Locator Transmission (ELT) installation, cabin aircraft location pictorial system installation, new entertainment system installation, SATCOM and Telephone installation, etc. The majority of these flights are conducted to check EMI only.

III. AMC to Appendix XII to Part-21

Create a new AMC to Appendix XII to Part-21

The following AMC is inserted:

AMC to Appendix XII to Part-21

Competence and experience of flight test engineers and of pilots engaged in categories 3 and 4 of flight testing

1. Competences and experience:

(a) The flight test engineer must have satisfactorily completed a specific training course approved by the competent authority.

Such training courses usually cover Performance; Handling Qualities; Systems and Test management, and should follow approximately the same outline as pilots undertaking the same category of test flights. Bachelor of Science or equivalent university standards are usually requested from applicants.

(b) The flight test engineer must have gained a significant amount of flight experience relevant for the task, and must have been trained for flight testing activities.

An example of such short courses lasts 15 weeks and the flying training amounts to 38 hours on 12 types of airplanes.

When such training is provided in-house in the case of large aeroplanes, ground training is provided by members of the company as part of their job and flight training is provided during real test flights. The trainee is added to the normal flight test crew.

(c) Flight crew members must:

- have gained a significant amount of flight experience relevant for the task; and

- have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness; or

- in the case of single-pilot aircraft have received a detailed briefing on the flight test to be performed; and

- in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL. The aim was to provide hands-on training. The important point is that the flight crew member follows all test flights "up to the issuance of their individual certificate of airworthiness". The intention is to cover a complete package of flights.

(d) Flight crew members must:

- have been appointed by the organisation performing the flight test; and

- have been informed on the change to type design for which the flight tests is to be undertaken; and

- in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL. The intention here is to perform the selection process; documenting it and providing the necessary briefings (several hours for each flight).