COMMENT RESPONSE DOCUMENT (CRD) TO NOTICE OF PROPOSED AMENDMENT (NPA) 2008-20

DRAFT OPINION OF THE EUROPEAN AVIATION SAFETY AGENCY,

For a Commission Regulation amending Commission Regulation (EU) No 748/2012 of 03/08/2012 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

and

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')

'Flight Testing'

Reactions to this CRD should be submitted via the CRT by clicking the 'add a general reaction' button. Please indicate clearly the applicable paragraph

EXECUTIVE SUMMARY*:*

This executive summary highlights the main topics addressed by the CRD 2008-20 'Flight Testing', as well as briefly summarizes the scope limitations. The comments received on this subject with the applicable replies provided, along with the resulting text for Part 21 and the corresponding AMCs/GMs are included in the attached document.

As 'Flight Testing' is a very specific activity and a key issue for the aircraft development and certification, the Agency decided to initiate a regulatory task: MDM.003. The NPA 2008-20 'Flight Testing' affecting the Part 21 was dated August 29, 2008 and comments were subsequently received by the closing date of January 31, 2009. A flight testing review group including industry and flight test schools has been created, to review the comments and to propose modifications to the regulations.

It is important to be noted that the applicability of this requirement was limited to exclude small aircraft (defined as ELA-1 and ELA-2). In addition, since this task focused only on 'Flight Testing', other types of flights (e.g. Maintenance check flights, Ferry flights) were not affected by this requirement. However, the Agency has recognized the importance to address other types of flights, therefore has already started the tasks: RMT.0393/.0394 (MDM.097(a)/(b)) Maintenance Check Flights and RMT.0348/.0349 (OPS.073) 'Flights related to design and production activity'.

Main topics addressed by the CRD 2008-20 ('Flight Testing') are:

- Definition of Categories of Flight Test : **Cat 1/2/3/4**
- Definition and Qualifications for lead flight test engineer for all categories of flight tests (for aircraft above 2 000 kg)
- Qualifications for pilots for flight tests Cat 3 and Cat 4 (for aircraft above 2 000 kg)
- Entry into force and transition measures
- Flight Test Operational Manual (FTOM)

As detailed within the CRD 2008-20, certain paragraphs in Part 21 have been revised and a new Appendix XII has been added. AMCs/GMs have been developed to provide further guidance on the newly introduced subjects.

While it is acknowledged that further work may be required to rationalise some subjects (e.g. the requirements to have or not a lead flight test engineer license), a delay in the publication of this material will be of an increasing concern. An A-NPA (Advance-NPA) will discuss the creation of a licensing scheme for a lead flight test engineer (lead FTE). Depending on the outcome of the A-NPA, a subsequent NPA may propose a licensing scheme for the lead FTE .

The changes proposed aim at increased safety when conducting flight testing, while minimizing any additional burden on the organisations involved.

Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA) 2008-20, dated 29 August 2008 was to propose an amendment to Commission Regulation (EU) No 1702/2003 (and Decision No. 2003/1/RM of the Executive Director of 17 October 2003[1]. The Commission Regulation (EU) No 1702/2003 has since been repealed by the Commission Regulation (EU) No 748/2012[2] of 30 August 2012.

2. **Scope of the change:**

Several comments have discussed the scope of the change and focused on three main issues: the applicability to small aircraft, the applicability to maintenance check flights and the applicability to other type of flights related to design and production activities.

- **Not applicable to small aircraft:**

  Aircraft defined as ELA-1 and ELA-2 have been excluded as a first step from the requirements of appendix XII. The definition of ELA-1 and ELA-2 may be found in Opinion 2011-1 (consolidated in the Regulation (EU) 748/2012 of 30 August 2012) and reads as follows:

  '*ELA1 aircraft' means the following manned European Light Aircraft:*

  (i) an aeroplane with a Maximum Take-off Mass (MTOM) of 1 200 kg or less that is not classified as complex motor-powered aircraft;

  (ii) a sailplane or powered sailplane of 1 200 kg MTOM or less;

  (iii) a balloon with a maximum design lifting gas or hot air volume of not more than 3 400 m^3 for hot air balloons, 1 050 m^3 for gas balloons, 300 m^3 for tethered gas balloons;

  (iv) an airship designed for not more than 4 occupants and a maximum design lifting gas or hot air volume of not more than 3 400 m^3 for hot air airships and 1 000 m^3 for gas airships;

  'ELA2 aircraft' means the following manned European Light Aircraft:

  (i) an aeroplane with a Maximum Take-off Mass (MTOM) of 2 000 kg or less that is not classified as complex motor-powered aircraft;

  (ii) a sailplane or powered sailplane of 2 000 kg MTOM or less;

  (iii) a balloon;

  (iv) a hot air ship;

  (v) a gas airship meeting all of the following elements:

  3% maximum static heaviness,
  Non-vectored thrust (except reverse thrust),
  Conventional and simple design of:

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[1] 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 organisation ('AMC and GM to Part-21'). Decision as last amended by Decision 2011/006/R of the Executive Director of the Agency of 26 August 2011.

[2] Commission Regulation (EU) No 748/2012 of 03/08/2012 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 *(OJ L 224, 21.8.2012, p.1-85)* and repealing Commission Regulation (EC) No 1702/2003 of 24 September 2003 (OJ L 243, 27.9.2003, p.6).

Structure;
Control system;
Ballonet system, and
Non-power assisted controls.

(vi) A Very Light Rotorcraft.

The rationale for this exclusion was that there are quite different approaches to flight test qualifications in Member States for such aircraft. Existing syllabi may not be very well adapted. ELA1 and 2 aircraft will be handled on a case by case basis when approving the flight conditions associated with the permit to fly or through the Flight test Operations manual (FTOM) of the relevant DOA or APDOA.

This approach will allow the Agency to gather further experience so that best practices can be identified. The possible extension of scope of Appendix XII will be the subject of a future rulemaking task.

Note: Aircraft included in Annex II of the Basic Regulation (such as homebuilt or historic aircraft) are outside the scope of EASA and therefore not affected by this opinion

- **Not applicable to maintenance check flights:**

  Maintenance check flights are not affected by this opinion. For the purposes of this opinion, the following are considered flight tests:

  - Flights for the development phase of a new design (aircraft, propulsion systems, parts and appliances);
  - Flights to demonstrate compliance to airworthiness codes;
  - Flights intended to experiment new design concepts, requiring unconventional maneuvers or profiles for which it could be possible to exit the already approved envelope of the aircraft; and
  - Flight test training flights.

  Maintenance check flights do not include such flights. The Agency recognises however the safety issue and has published a term of reference and a NPA for the tasks RMT.0393/0394 (MDM.097) (a) and (b)[3]. This task called Airworthiness and operational aspects for maintenance check flights, should lead to the publication of an opinion by the second quarter of 2014 and a decision by the second quarter 2015.

- **Link with other rulemaking tasks:**

  Flight tests departments of manufacturers are conducting also other flights such as ferry flights. These flights are not covered by this task which only focuses on flight testing. The Agency has recognized the need to provide appropriate regulation for these other types of flights and plans to complement what has been introduced in the Opinion for Part-FCL (paragraph FCL.700(c)) by performing task RMT.0348 and .0349 (previously OPS.073) (a) and (b)) relative to the operational requirements for flights related to the design and production activities. These tasks have been started during the 2nd quarter of 2012 and are planned to end on 1st quarter 2015 and 1st quarter 2016 respectively. In the meantime, the operational rules for such flights and for flight tests will be covered by National rules and will be exempted from EASA operational rules.

3. **Structure of the requirements:**

[3] The TOR is published at: http://easa.europa.eu/rulemaking/docs/tor/mdm/ToR%20MDM.097(a)&(b).pdf
The group composition is published at http://easa.europa.eu/rulemaking/docs/gc/mdm/GC%20MDM.097(a)&(b).pdf.

The Agency acknowledges that the structure of the requirements for flight test is somewhat complicated, therefore the legal basis for the requirements for flight test crew has received significant consideration. The classification of flight test in 4 Categories is primarily linked to considerations of using special techniques and skills. The different legal bases 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, 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 H (type and class ratings) and I (additional ratings) of Part-FCL[4]. The corresponding requirements for flight test training organisations are now included in annex VII of Regulation 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council.

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 requirements regarding qualification of flight test engineers and 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 Subpart P to Part-21 of Regulation 1702/2003 (now repealed by the Commission Regulation (EU) No 748/2012). 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 can include the conditions and restrictions imposed on the flight crew members and their

[4] Regulation 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council can be found at: http://easa.europa.eu/regulations/flight-standards-implementing-rules.php

qualification to fly the aircraft. A reference to a specific Appendix XII to this paragraph has been created for that purpose in that paragraph.

4. **Flight Test Engineers (FTE)**

The approach chosen in the opinion has been to provide specific requirements for what has been called lead flight test engineers and leave the definition of requirements for other flight test engineers to the flight test operations manual avoiding thus to identify all possible categories of flight test engineers. There are indeed different views within the Member States and the profession.

A lead flight test engineer has been defined as follows:
'Lead Flight Test Engineer' designates a flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities.
The key words are 'conducting flight test or assisting the pilot in the operation of the aircraft and its systems' as only a limited number of flight test engineers perform such tasks. These tasks are important for the safety of flight and specific requirements are justified in that case.

Flight test engineer has been defined as follows:
Flight test engineer is any engineer involved in flight test operation either on the ground or in flight.

The lead flight test engineer shall receive an appropriate level of training ensuring a level of competence commensurate for the type of test and the complexity of the aircraft under test, have accumulated a minimum of flight experience and can only be appointed for a specific flight if they are physically and mentally flight fit to discharge assigned duties and responsibilities (An AMC provide further details relative to the conditions of appointment). All this is materialised by the issue by the organisation that employ him of an authorisation in a comparable manner to the authorisation issued for compliance verification engineers.

- **How to address the issue of the licensing of lead FTE?**

  The approach described above has received adverse comments from flight engineers from two Member States that issue today licences for flight test engineers and where a significant amount of design activities are being done today (France and Italy). Therefore this point has been discussed in depth within the group who has agreed to the Agency's proposal outlined below:

  1. Opinion for Part-21:
  The Agency intends to publish the opinion corresponding to this CRD by the end of 2012. This opinion will define FTE and contain safety requirements for their experience, medical fitness and training. It will also propose the necessary transition measures, including grand-fathering rules. Compliance with the requirements will be confirmed by the Part-21 organisation employing the FTE.
  Furthermore, this opinion will propose a long transition period specific to FTE: its purpose will be to allow existing national licensing schemes to continue to apply for a certain period which we estimate is likely to end by 2016. During this period, Member States will apply the requirements of Part-21, but those countries that have a licensing scheme in place at the entry into force of the amendment to Part-21 will be able to continue to use it until the end of the transition period.
  The adoption of this opinion should be within a timescale consistent with the opt-out for Part-FCL. Indeed Part-FCL refers to Part-21 for the definitions of the flight test categories.

The rationale for such the transition period mentioned above is to allow further work on the issue of FTE licenses. This complementary work recorded under a separate rulemaking task RMT.0583 (MDM.003(c)) will follow a two-step approach: an advance NPA (A-NPA) first and then, depending on its outcome, possibly an NPA.

2. Advance-NPA on FTE licences

An A-NPA is a pre-rulemaking act that allows asking questions on possible regulatory options and gathering data and information. It may or may not contain a proposed rule. It is specifically envisaged by article 14 of the EASA Management Board decision EASA MB 01-2012[5] that adopted the EASA rulemaking procedure.

The purpose of the A-NPA will be to gather the views of all European stakeholders on the issue. It will be circulated for comments 2 months after the opinion corresponding to this CDR is published.

The A-NPA RMT.0583 (MDM.003(c)) will discuss the creation of a licensing scheme for what is called in this CRD a 'lead FTE': it will describe the issues, the pros and cons and explore where to include the requirements for a licence. The expression 'lead FTE' is at this stage a writing convention, but it refers to a Flight Test Engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities. It therefore does not cover all the professionals that are called FTE to day.

The schedule of the A-NPA is as follow: Consultation should start during the 4th quarter 2012 and should close during the 1st quarter 2013; an Agency's decision on the further course of action is expected by the second quarter of 2013. When taking this decision, the Agency will take into account not only the result of the consultation of the A-NPA, but also the inputs from the dedicated review group.

3. NPA:

Depending of the outcome of the A-NPA, the NPA will propose a licensing scheme for 'lead FTE'.

The working method could be a rulemaking group, which composition will be based on the existing dedicated review group.

5. Grand-father rule

A proposal for a grandfather rule has been included in an article (entry into force and transition measures) of the regulation that will amend Part-21. This proposed grandfather rule is applicable to all FTEs and pilots engaged in Category 3 and 4 of flight test and allows crew members to continue to exercise their present scope of functions. For pilots Category 1 and 2, it has been included in the cover regulation for Part-FCL (article 5 flight test pilots). The rule envisages that the scope of functions will be defined by the competent authority.

The article also includes the transition period allowing Member States that have at the date of entry into force of the amending regulation a licensing scheme for flight test to continue to apply it until 31 December 2016.

Further the article provides for a 36 months period to adapt to the new rules.

6. Applicability for third countries:

Several comments have requested to clarify the applicability of the opinion to Part-21 to third countries. To address this point the group has considered two scenarios:

5 Decision of the Management Board amending and replacing Decision 08-2007 concerning the procedure to be applied by the Agency for the Issuing of Opinions, Certification Specifications and Guidance Material ('Rulemaking Procedure') can be found at: http://easa.europa.eu/management-board/management-board.php

- Scenario 1 : Non-EU registered aircraft; non-EU licensed crew (E.g. tests performed to obtain an EASA validation of a TC or STC by a non-EU applicant)
- Scenario 2: EU registered aircraft; non-EU licensed crew (E.g. EU applicant using non-EU crew or foreign NAA validating an EU product)

For **scenario 1, Part-21 does not apply as there is no permit to fly.**

For **scenario 2**, Part-21 and Part-FCL will apply for aircraft that are in the scope of FCL.820 or the scope of appendix XII of Part-21 but one could be more specific when separating the case of pilots from the one of flight test engineers:

- Pilots: the case has been covered by annex III (Requirements for the acceptance of licenses issued by or on behalf of third countries) paragraph A6 of Part- FCL:
  - ***Validation of pilot licenses for specific tasks of limited duration***
    Notwithstanding the provisions of the paragraphs above, in the case of manufacturer flights, Member States may accept a license issued in accordance with ICAO Annex 1 by a third country for a maximum of 12 months for specific tasks of limited duration, such as instruction flights for initial entry into service, demonstration, ferry or test flights, provided the applicant complies with the following requirements:
    (a) holds an appropriate license and medical certificate and associated ratings or
    qualifications issued in accordance with ICAO Annex 1;
    (b) is employed, directly or indirectly, by an aeroplane manufacturer.
    In this case, the privileges of the holder shall be limited to performing flight instruction and testing for initial issue of type ratings, the supervision of initial line flying by the operators' pilots, delivery or ferry flights, initial line flying, flight demonstrations or test flights.

- For Flight Test Engineers working as defined in Part-21, Part-21 applies. The requirements for Lead FTE for Category 3 and Category 4 could be met without too many difficulties. However, the requirements for Lead FTE for Category 1 and Category 2 mean that a specific training course has been satisfactorily completed and this may be more difficult to achieve. It should be noted that there is no obligation to use a lead FTE, however when one is used Part-21 would need to be complied with. Therefore this may not be a too frequent scenario and instead of drafting rule material for very specific case, it is proposed that the case could be covered by article 14 exemptions for POA and article 18(d) exemptions for DOA. If the frequency of such scenario increases with time, the experience gained will be used to consider an amendment to the rule.

7. Improvement for the FTOM rule

Based on the comments received and the experience within the review group, the requirements and AMC for the flight test operations manual have been reviewed. When reviewing the balance between the rule and the AMC, it was found that the rule was too generic and the rule has been further developed to define the essential elements that must be found in a flight test operations manual.

8. Development of syllabi:

To address several comments, detailed syllabi have been developed for lead flight test engineers to cover the case of Category 1 and Category 2 flights. They have been modelled on the ones developed for the corresponding categories for test pilots and incorporated as AMC in Part-FCL. The same approach of competency based training has been followed. It should be noted that such training does not need to be given by an

approved organisation, provided that is considered acceptable by the Part 21 organisation employing the FTE.

9. **Development of AMC for the categories of flight**

To address many comments received on clarification of the categories of flight test (in particular the boundary between Category 2 and Category 4), extensive guidance material has been drafted. The definitions contained into Appendix XII have also been improved and a definition of flight test for the purpose of the appendix has been added. Category 4 has been defined by opposition to Category 1 and 2.

II. Consultation

10. The draft Executive Director Decision amending Commission Regulation (EC) No 1702/2003 of 24 September 2003 and Decision No. 2003/1/RM of the Executive Director of 17 October 2003 was published on the web site (http://www.easa.europa.eu) on 29 August 2008.

By the closing date of 31 January 2009, the European Aviation Safety Agency ('the Agency') had received 319 comments from 67 National Aviation Authorities, professional organisations and private companies.

III. Publication of the CRD

11. All comments received have been acknowledged and incorporated into this Comment Response Document (CRD) with the responses of the Agency.

12. In responding to comments, a standard terminology has been applied to attest the Agency's acceptance of the comment. This terminology is as follows:

- **Accepted** – The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
- **Partially Accepted** – Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
- **Noted** – The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
- **Not Accepted** - The comment or proposed amendment is not shared by the Agency

The resulting text highlights the changes as compared to the current rule.

13. The Agency's Opinion will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.

14. Such reactions should be received by the Agency not later than **13 November 2012** and should be submitted using the Comment-Response Tool at http://hub.easa.europa.eu/crt.

IV. CRD table of comments, responses and resulting text

(General Comments)	-

comment	*6* comment by: *trevor sexton* Since all test flights are being done under a Permit to Fly. There seems to be a few problems with test flights/permit to fly flights that cross borders within the EU. A number of countries/NAAs have put up restrictions to stop flights from aircraft from another country within the EU entering their airspace on a test flight/permit to fly without first getting permission and then putting furthur restriction on how long they can stay and on specific days. And may even charge a large fee for doing this. There is a little know european agrrement called " 1980 ECAC' agreement " that every country in europe signed that allows for the free movement of permit aircraft but over the mists of time a number of european countries have decide to forget this agreement. I believe that EASA should ever ratify that this agreement is still in place or should come up with more upto date regulations.
response	*Noted* The agreement mentioned in the comment was addressing permanent permit to fly issued to homebuilt aircraft. Referring to that agreement only, would not have solved the problems of recognition of flight test qualifications experienced on large aeroplanes. The Agency proposal is therefore to define minimum standards that allow for mutual recognition.

comment	*8* comment by: *Lufthansa German Airlines* Lufthansa German Airlines is in support of the NPA if it is ensured that Maintenance Check Flights after Major Overhaul are not falling under the category of Test Flights acc. to this NPA and can still be performed by typerated flight crews.
response	*Accepted* Maintenance flight checks are excluded from the scope of this proposal. They are discussed under task MDM.097 (RMT.0393/.0394 which has started already and is due to finish in 2014-2015.)

comment	*10* comment by: *Aerodata AG* As the NPA is written now and how the boundary between Cat.2 and Cat.4 flight testing is defined, the effect on the flight test activities that is usually required while performing STC avionics upgrade work would be severe. The need for having to carry out most of the testing with Cat.2 rated pilots and flight test engineers while the testing is currently performed by experienced pilots and test engineers will especially make STC work on part 23 type aircraft unreasonably expensive or even impossible.
response	*Accepted*

This boundary between category 2 and category 4 test flights has been discussed in detail by the review group and extensive guidance material has been produced.

comment *68* comment by: *EADS CASA*

As a General comment EADS-CASA opinion is that the NPA bears a high economic impact and a heavy impact on the current ways of working in the formation of flight crew members and recruitment practices that is not justified by the current safety record of the European aircraft manufacturers nor by the stated objectives of the NPA.
The scope of this NPA is defined in the Terms of Reference (TOR) Nr: MDM/003, that indicates that the NPA originates from an industry's request to harmonize Flight Test Crew Requirements, categorization of the different type of manufacturer's flights and Flight Tests practices across Europe. All of this should improve the free circulation of persons and services in Europe as well as easy industrial co-operation. On the other hand, the TOR do not identify the need to correct unsafe conditions associated to pilots qualification in the Flight Test activities. Only the development by the aircraft manufacturers of a Flight Test Operation Manual is linked with an improvement of safety.
Furthermore, EADS-CASA considers that industry's practices have considerably evolved since the original AECMA request in 1998 further improving safety in Flight Test activities The NPA focuses too much on flight crew formal accreditation, disregarding the contribution to flight test safety of the overall framework encompassing Flight Test activities performed by DOA organizations. Without being exhaustive, aspects like manufacturers flight crew involvement in all stages of the design project, experience with-similar- products and designs, deep knowledge of the design or use of simulators are factors that in the opinion of EADS CASA contribute to safety at least as much as formal accreditation of flight crews through an academical training course. A pilot, with a CPL for the airplane category, trained by the DOA organization with experience in different stages of the design is really well prepared to participate in development and certification flights, without the need of a formal accreditation trough an external course.
Consequently the proposed rule has to incorporate alternative procedures for Flight crew qualification within DOA organizations. These procedures could be incorporated in the design organization handbook as well as in the new FTOM, and be subject of approval by the authority.
Since the safety of the flight test activities is not an issue driving this proposal, the impact of the application of the NPA must be assessed against the perceived benefits over the current industry's practice, avoiding undue high economical burdens and discontinuities in the ways of working.

response *Noted*

The comments received on the NPA have been reviewed by a group where Industry and flight tests training schools were involved. The Agency believes that the resulting text is an acceptable minimum standard.

comment *110* comment by: *ECA- European Cockpit Association*

ECA would prefer to integrate the provisions of this NPA in the framework of Flight Crew Licensing.

The Core of this NPA relates to training and licensing and would be better place in the context of the Flight Crew Licensing rules currently open for comments in

NPA 2008-17.

This NPA would pose legal difficulties for the certification of third countries products. The adoption of this NPA would imply that foreign manufacturers seeking EASA certification would have to employ EASA licensed test pilots. If this regulation is incorporated under the FCL framework, this would not be the case.

response

Not accepted

FCL applies only to pilots: it is not possible in this NPA to include requirements for flight test engineers in FCL (see answer to comment 127). In addition, asking formal ratings for pilots performing category 3 and category 4 flight tests would not be proportionate to the risk involved.

Concerning third countries: the review group has identified 2 scenario

- Scenario 1: Non-EU registered aircraft; non-EU licensed crew:
  - E.g. tests performed to obtain an EASA validation of a TC or STC by a non-EU applicant
- Scenario 2: EU registered aircraft; non-EU licensed crew:
  - E.g. EU applicant using non-EU crew
  - E.g. foreign NAA validating an EU product

For scenario 1, Part-21 does not apply as there is no permit to fly.

For scenario 2:

- General:
  - Part-21 and Part-FCL will apply for aircraft that are in the scope of FCL.820 or the scope of appendix XII of Part-21
- PILOTS: covered by FCL:
  - **Validation of pilot licenses for specific tasks of limited duration**
    - 6. Notwithstanding the provisions of the paragraphs above, in the case of manufacturer flights, Member States may accept a license issued in accordance with ICAO Annex 1 by third countries for a maximum of 12 months for specific tasks of limited duration, such as instruction flights for initial entry into service, demonstration, ferry or test flights, provided the applicant complies with the following requirements:
      - (a) holds an appropriate license and medical certificate and associated ratings or qualifications

issued in accordance with ICAO Annex 1;

- (b) is employed, directly or indirectly, by an aeroplane manufacturer.
- In this case, the privileges of the holder shall be limited to performing flight instruction and testing for initial issue of type ratings, the supervision of initial line flying by the operators' pilots, delivery or ferry flights, initial line flying, flight demonstrations or test flights.

- FTE working as defined in Part-21: Part-21 applies
  - Requirements for FTE for cat 3 and 4 could be met
  - Requirement for FTE for cat 1 and 2 mean that a specific training course has been satisfactorily completed
  - Is this a frequent scenario?
    - Could be covered by article 14 exemptions for POA and article 18(d) exemptions for DOA

comment

127 comment by: *Pellerin*

Attachment #1

Attached is the result of Crew members' reflexion within the Test Department of Airbus. The following ideas were considered as paramount :

1 - Since ICAO points the licence as the document on which authorization for testing is posted, it should remain a basic document for Crew members, including engineers and cabin crew.

2 - A competent and independant authority should remain the reference in the process of licensing.

3 - A first flight in production is not an ordinary production flight and the crew should be able to face any situation that can occur.

4 - A flight after a maintenace party can be much more than an ordinary check flight. Therefore, the classification in CAT2 should be considered depending on the work performed during the party.

response

Noted

FTE licenses:
There have been intense discussions within the review group in relation to the issue of FTE licenses. The review group agreed with the Agency's proposal outlined below:

1. Opinion for Part-21:
The Agency intends to publish an opinion proposing amendments to Part-21 by the very end of 2012. This opinion will define FTE and contain safety requirements for their experience, medical fitness and training. It will also

propose the necessary transition measures, including grand-fathering rules. Compliance with the requirements will be confirmed by the Part-21 organisation employing the FTE.
Furthermore, this opinion will propose a long transition period specific to FTE. Its purpose will be to allow existing national licensing schemes to continue to apply for a certain period which we estimate is likely to end by 2016. During this period, Member States will apply the requirements of Part-21, but those countries that have a licensing scheme in place at the entry into force of the amendment to Part-21 will be able to continue to use it until the end of the transition period.
The rationale for such a transition period is to allow further work on the issue of FTE licenses. This work will follow a two-step approach: an advance NPA (A-NPA) first and then, depending on its outcome, possibly an NPA.
The Commission will adopt this opinion within a timescale consistent with the one for Part-FCL. Indeed Part-FCL refers to Part-21 for the definitions of the flight test categories.

2. Advance-NPA on FTE licences
An A-NPA is a pre-rulemaking act that allows asking questions on possible regulatory options and gathering data and information. It may or may not contain a proposed rule. It is specifically envisaged by article 14 of the EASA Management Board decision that adopted the EASA rulemaking procedure.
The purpose of the A-NPA will be to clarify the views of all European stakeholders on the issue.
The A-NPA will discuss the creation of a licensing scheme for what I will call here a 'lead FTE': it will describe the issues, the pros and cons and explore where to include the requirements for a licence. The expression 'lead FTE' is at this stage a writing convention, however, it refers to a Technical Flight Crew Member assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities. Therefore, it does not cover all the professionals that are called FTE to day.
The schedule of the A-NPA is as follow: Consultation should start by the end of the first quarter of 2013 and close by the end of the second quarter; an Agency's decision on the further course of action is expected by the third quarter of 2013. When taking this decision, the Agency will take into account not only the result of the consultation of the A-NPA, but also the inputs from the dedicated review group.

3. NPA:
Depending of the outcome of the A-NPA, the NPA will propose a licensing scheme for 'lead FTE'.
The working method will be a rulemaking group, which composition will be based on the existing dedicated review group.

Maintenance check flights:
These flights are excluded from the scope of this NPA and will be handled by another rulemaking task MDM.097 (RMT.0393/.0394) started already and due to finish in 2014-2015.

First flight in production:
This point has been addressed in the guidance material produced for categories of flight test.

comment *145* comment by: *CAA CZ*

	1. We recommend to resolve, within the framework of this NPA, an issue of involving certification team members in flight tests as FTP/FTE onboard. These members should be nominated by the competent authority, which would be responsible for their competence and qualification for the required and by the authority specified tasks during flight. 2. We recommend to extent the requirements for FTP/FTE to other aircraft categories (CS-22, CS-VLA, CS-VLR and CS-31) in future. The common requirements for determination of FTP/FTE for these categories of aircraft would, according to our opinion, prevent situations where manufacturers prefer economic aspects over safety aspects. 3. This NPA does not include requirements for the "check flights". Presently these requirements are covered by CAA CZ directive together with the requirements for flight tests in the Czech Republic. Will these requirements be also covered by EASA rulemaking procedures in the future?
response	*Noted* **Point 1:** It is expected that the EASA test team will comply with Part-21 including the grand-father rules. Furthermore, the company will have to address the point in its Flight Test Operations Manual. Concerning third countries, the group has identified two scenarios: • Scenario 1 : Non-EU registered aircraft; non-EU licensed crew: – E.g. tests performed to obtain an EASA validation of a TC or STC by a non-EU applicant. • Scenario 2: EU registered aircraft; non-EU licensed crew: – E.g. EU applicant using non-EU crew; – E.g. foreign NAA validating an EU product. For scenario 1, Part -21 does not apply as there is no permit to fly: • Two possible situations: – With bilateral: no need to comply with our rules as Bilateral allow exemptions from Part-21 provisions and thus from FCL; – With working arrangements: the above is not possible but as there is no EASA permit to fly, Part-21 is not applicable. For scenario 2: • General: – Part-21 and Part-FCL will apply for aircraft that are in the scope of FCL.820 or the scope of appendix XII of Part-21. • PILOTS: covered by FCL: – **Validation of pilot licences for specific tasks of limited duration** • 6. Notwithstanding the provisions of the paragraphs above, in the case of manufacturer flights, Member States may accept a licence issued in accordance with ICAO Annex 1 by third countries for a maximum of 12 months for specific tasks of limited duration, such as instruction flights for initial entry into service, demonstration, ferry or test flights, provided the applicant complies with the following requirements: • (a) holds an appropriate licence and medical certificate and associated ratings or qualifications issued in accordance with ICAO Annex 1; • (b) is employed, directly or indirectly, by an aeroplane manufacturer.

- In this case, the privileges of the holder shall be limited to performing flight instruction and testing for initial issue of type ratings, the supervision of initial line flying by the operators' pilots, delivery or ferry flights, initial line flying, flight demonstrations or test flights.

- FTE working as defined in Part-21: Part-21 applies
  - Requirements for FTE for cat 3 and 4 could be met;
  - Requirement for FTE for cat 1 and 2 mean that a specific training course has been satisfactorily completed.
  - Is this a frequent scenario?
    - Could be covered by article 14 exemptions for POA and article 18(d) exemptions for DOA.

Point 2:
Agreed, this extension has been planned. It will be done when we have achieved more experience.

Point 3:
Maintenance check flights are not within the scope of this NPA and will be handled by task MDM.097 (RMT.0393/.0394) started already and due to finish in 2014-2015.

comment *166* comment by: *John Tindall*

As a GA instructor and examiner, and if post maintenance test flights are reintroduced, I agree with the sentiment that to test at this level ,only the minimum of training would be required by an experienced pilot.

response *Noted*

Maintenance check flights are not within the scope of this NPA and will be handled by task MDM.097 (RMT.0393/.0394) started already and due to finish in 2014-2015.

comment *168* comment by: *CEV. France*

CEV Comment n°1
Authorities flight test authorisation
The NPA 17 (FCL.820) and NPA 20 (Part 21) define the minimum requirements for pilot and flight test engineer involved in flight tests.
Are those requirements applicable to authority flight crew during certification flights? If yes, then some authorities could have some difficulties to follow those requirements (FAA TCAA ….).
An exemption to those requirements could be thought about in order to allow authorities to perform their duties.

response *Noted*

It is expected that the EASA test team will comply with Part-21 including the grand-father rules.
Furthermore, the Company will have to address the point in its Flight Test Operations Manual.
Concerning third countries the group has identified two scenarios:

- Scenario 1 : Non-EU registered aircraft; non-EU licensed crew:
  - E.g. tests performed to obtain an EASA validation of a TC or STC by a non-EU applicant.
- Scenario 2: EU registered aircraft; non-EU licensed crew:
  - E.g. EU applicant using non-EU crew;
  - E.g. foreign NAA validating an EU product.

For **scenario 1, Part-21 does not apply as there is no permit to fly**:

- Two possible situations:
  - With bilateral: no need to comply with our rules as Bilateral allow exemptions from Part-21 provisions and thus from FCL;
  - With working arrangements: the above is not possible but as there is no EASA permit to fly, Part-21 is not applicable.

For scenario 2:

- General:
  - Part-21 and Part-FCL will apply for aircraft that are in the scope of FCL.820 or the scope of appendix XII of Part-21.
- PILOTS: covered by FCL:
  - **Validation of pilot licences for specific tasks of limited duration**
    - 6. Notwithstanding the provisions of the paragraphs above, in the case of manufacturer flights, Member States may accept a licence issued in accordance with ICAO Annex 1 by third countries for a maximum of 12 months for specific tasks of limited duration, such as instruction flights for initial entry into service, demonstration, ferry or test flights, provided the applicant complies with the following requirements:
      - (a) holds an appropriate licence and medical certificate and associated ratings or qualifications issued in accordance with ICAO Annex 1;
      - (b) is employed, directly or indirectly, by an aeroplane manufacturer.
      - In this case, the privileges of the holder shall be limited to performing flight instruction and testing for initial issue of type ratings, the supervision of initial line flying by the operators' pilots, delivery or ferry flights, initial line flying, flight demonstrations or test flights.
- FTE working as defined in Part-21: Part-21 applies
  - Requirements for FTE for cat 3 and 4 could be met;
  - Requirement for FTE for cat 1 and 2 mean that a specific training course has been satisfactorily completed.
  - Is this a frequent scenario?
    - Could be covered by article 14 exemptions for POA and article 18(d) exemptions for DOA.

comment	*183* comment by: *CAA-NL* we support this NPA. No comments.
response	*Noted* The Agency thanks the commentator for his support.

comment	*184* comment by: *Sam Sexton* **Aircraft on Permits to Fly.** There are a lot of restrictions in Europe on the movement of Permit to fly aircraft. Therefore if say Airbus wanted to fly a development aircraft from these facilities in Hamburg to Airbus in Toulouse then they would have to plan to route around Belgium airspace.. Belgium have many restrictions on Permit aircraft through there airspace. Quote:- Belgium, Aircraft not registered in Belgium and not having an ICAO/EASA certificate of airworthiness require special permission to fly in Belgian airspace. This permission may be granted for a period not exceeding 30 days over a period of 12 months to which you have to show a lot of documentation and then pay a fee for this permission and there are a lot of restrictions. Additionally the UK has also now instigated similar restrictions this is now affecting Permit aircraft that want to route to and from Ireland. There is a little Know EU agreement called the:- '1980 ECAC' agreement', In 1980 all European countries signed this agreement to recognise each other's Permits to Fly (or local equivalents) Alas many European countries are now disregarding this agreement and insisting on restriction via written permissions and charging excessive fees for giving this permission.
response	*Noted* Please see reply to comment 6.

comment	*186* comment by: *AgustaWestland Flight Test* AgustaWestland Test Pilots, on behalf of ANPiCo (Italian Association of Test Pilots), agrees on the general approach of this document. However: 1. It is necessary to take into account the different regulations in force in European Member States that may incorporate license privileges not taken into account by the foreseen EASA regulation; 2. It is necessary to foresee a verification/evaluation of the "Grandfather Privileges" by a competent authority to assess the experience of the candidate to be able to perform the relevant categories of flight test in his/her organization/Company; 3. Regarding the production flight test (Category 3 flights) it is necessary to grant a formal validation, by the recognised Authority, of a training syllabus and flight training activity aimed at the formation of Company flight crews. This information may be contained in the approved Flight Test Operational Manual; 4. Where Category 4 activities (minor changes) are foreseen, it should NOT be necessary for the Company (generally a small maintenance firm or a transport operator) to formalise a Flight Test Organization, nor a Flight Test Operation Manual.
response	*Noted* **Point 1:** It is assumed that the comment is referring to FTE licences. For this

issue please refer to comment 127.

Point 2: Agreed. There will be a grand-father rule. For the Pilots performing category 1 and 2 flight test this will take the form of a conversion report established by the competent authority. For flight test pilots engaged in category 3 and 4 flight test and Flight test Engineers a rule has been introduced in the transition measures of the amending regulation to Part -21: the principle is that the competent authority will establish the scope of function based on information presented by the crew members and on the records held by the organisation that employ them.

Point 3: Agreed that it will be covered by the FTOM.

Point 4: If the application for a minor change is made by a non-DOA or APDOA holder, then the issue would be addressed by the flight conditions associated with the permit to fly.

comment *202* comment by: *ETPS CI*

The NPA fails to define a Flight Test Engineer (FTE). There needs to be clarity on what is an FTE and what is a Flight Test Observer (FTO). It is recommended that the NPA specify that an FTO's role is to observe and record only while an FTE will manage, and in some part be responsible for, the preparation, conduct and reporting of a trial.

response *Accepted*

The FTE subject to requirements in Part-21 has been defined. Lead flight test engineer is a flight test engineer assigned for duties in an aircraft for the purpose of conducting flight test or assisting the pilot in the operation of the aircraft and its systems during flight test activities.

comment *208* comment by: *SPANAIR*

A. INTRODUCTION

CS25 aircraft operators are requested by aircraft manufacturers and the respective aviation authorities to perform in-flight tests (defined below as TECHNICAL TEST FLIGHTS - TTF) to meet aircraft airworthiness requirements after heavy maintenance checks as well as to confirm the suitability of heavy structural repairs or repairs after multiple system failures.

Although Procedures and Regulations for such tests have been issued by various Civil Aviation Authorities, there are no regulations from the Agency as this NPA attempts to regulate test flight activities of a different nature.

Moreover, such test flights are usually performed under the regulations of a Permit to Fly.

The omission of such test flights in NPA 2008-20 is not consistent with its objective of assuring the quality and safety of all kinds of test flights.

While there are strict training and qualification regulations for Flight Instructors operating aircraft in normal situations, it seems unacceptable that inadequately trained and qualified crews should fly aircraft operating near the envelope limits and testing systems in abnormal configurations.

We propose establishing different flight test categories associated to the different competence levels and experience of flight test crews and also to clearly separate flight tests from check flights. In any case, all crew members involved in flight tests of any kind should hold appropriate qualifications and undergo adequate training.

Spanair has more than 20 years' experience in post maintenance and operational test flights, performed by a team of specifically trained and skilled pilots and supported by well defined Flight Test Operations and Test Procedures manuals.

response *Noted*

Maintenance check flights are not within the scope of this NPA and will be handled by task MDM.097 (RMT.0393/0394) started already and due to finish in 2014-2015. The comment will be passed to the people responsible for the task.

comment *213* comment by: *SPANAIR*

D. CONCLUSIONS

In this NPA, the Agency shall consider regulating maintenance and operational flight testing activities.

Flight safety implications and records of incidents related to Technical Test Flights should be sufficient to warrant the inclusion of Technical Test Flights in the proposed EASA regulations, as in the case of manufacturers' operational and production test flights.

Attached is a Technical Pilots Training Program available at a well-known and recognised Test Pilot School, designed according to two large manufacturers' guidelines, with a duration of two to three weeks and including ground, simulator and flight training.

TECHNICAL PILOT COURSE - TPC

Tests and Technical Pilots Courses – TPC - shall be performed in approved Test Pilots Schools and shall include the following syllabus

1. - THEORICAL

Introduction

Safety Procedures
Introduction to Acceptance Flight Testing
Cockpit Resource Management
Acceptance Check-List
Flight Test Techniques

Cockpit Evaluation

Basic Subsonic Aerodynamics
Lift-Drag

Performances
Calculations and Test Techniques
Takeoff, Climb, Cruise, Landing
Rejected Takeoff
Single Engine Landing

Stability & Control
Aircraft Design
Aeroelasticity Tests
Stability Derivatives
Handling Characteristics
Trim Techniques & Checks: High/Low Speeds
Dynamic Tests: Dutch-Roll
Phugoids
Stalls
Asymmetric Flight
Engine-out Theory
Upset Recovery
Roll Response and Handling

Systems
Flight Controls: Purpose
Actuation, Driving, Monitoring
Relationship
Flight-by-Wire
Yaw Damper
Navigation
Flight Management Systems
Hydraulics
Electrical
Fuel
Warnings
EIS, Radar, EGPWS, TCAS, ACARS, ATSV

Certification
FAR / JAR 25

Documentation
AFM
DDG, MMEL
Writing Report Technique

2.- SIMULATOR – AIRPLANE

Stability Checks: Stick Fixed, Stick Free
Trim
Phugoids

Dutch Rolls

Flight Instruments
Instruments Checks
Pitot Failures
Partial Instruments Flight

Partial Controls Flight
Rudder Failure
Ailerons Failure
Elevator Failure

Asymmetric Flight
Single-Engine Flight (Vmca, Vmcg, Vmcl-1
All Engine Loss: High / Low Altitudes

Speed Checks
Alpha Speed
Stalls
VMO / MMO
Buffet Onset

Upset Recovery

Flight Acceptance Procedures

response

Noted

Maintenance check flights are not within the scope of this NPA and will be handled by task MDM.097 (RMT.0393/.0394) started already and to due to finish in 2014-2015. The comment will be passed to the people responsible for the task.

comment

260 comment by: *Light Aircraft Association UK*

These comments are made on behalf of the Light Aircraft Association, UK, which represents Light Aircraft pilots and owners in the UK.

Further comments are made against specific paragraphs later in the document; however, a general comment is made here.

The NPA doesn't specifically detail how the proposals will be applied to non-Annex II aircraft being operated on an EASA Permit to Fly during activities such as investigating changes associated with an STC application.

The LAA proposes that for such aircraft, an owner/operator with sufficient experience be considered appropriate to fly the less demanding and low-risk test flying sorties.

response

Noted

The aircraft handled by LAA have been excluded from the scope of this NPA.

comment *274* comment by: *EFLEVA*

The comments logged here are from EFLEVA.

EFLEVA is the European Federation of Light, Experimental and Vintage Aircraft. This is a federation representing national associations in the areas of light, amateur build, vintage & classic aircraft from states, which are members of the European Civil Aviation Conference (ECAC). Twelve national associations from eleven countries currently form the federation.

There is no information in the NPA relating to aircraft, which are EASA types and are operating under a PtF for the purposes of flight-testing to determine performance following application of a new STC or replacement parts such as engine or propeller. EFLEVA considers that for the low-risk testing of such individual aircraft, the owner pilot should be authorised to test fly the aircraft.

EFLEVA considers that for small light aircraft such as ELA1 and ELA2 approved under CS-23 the proposed flight test crew qualifications are over prescriptive. It is often the case that aircraft of the lighter types may be test flown by a pilot of relatively low experience, but under the guidance of a more experienced flight test technician. Similarly an experienced pilot will often take an inexperienced observer simply to make a record of data during a test flight.

response *Accepted*

Amateur-built and vintage aircraft are Annex II and are outside the scope of EASA regulation.
Based on EFLEVA and other comments, ELA1 and ELA2 aircraft have now been excluded from the scope of this NPA.

comment *290* comment by: *Polish Aviation Authority, Aviation Technical Department*

General Comment

Our opinion presented below concerns only problems connected with test flights performed to achieve information regarding flight characteristics, condition of aircraft and their elements and equipment.

Polish Aviation Authority has participated in works of the JAA Working Group that acted in years 2000 to 2002 as so called the Flight Test Working Group. Therefore we would like to express our satisfaction that proposals elaborated by that Group have been partly used in the published NPA.

We remember also, that the first proposal of that Group was to elaborate single separate Part of JAR regulations called JAR FT containing in one document all regulations concerning flight testing on all stages of the process from research and development flights, through certification flights, production flights and flights connected with replacement of equipment which have not influence on performance and flight characteristics, and also check flights during operating and maintenance. Our Authority has supported such an idea.

Now In Poland we have national regulations concerning flight testing based on propositions elaborated by the JAA Flight Test Working Group.

After joining the EU up to now we obtained already:

1) COMMISSION REGULATION (EC) No 375/2007 of 30 March 2007 amending Regulation (EC) No 1702/2003 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 organizations. This Regulation implements new Subpart P – Permit to Fly.

2) 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

3) Recently we obtained **NPA 2008 – 17A** and **NPA 2008 – 20**.

4) The NPA 20 contains announcement of additional regulations on Part Management Systems (regarding Training Organizations) and the information in paragraph 22c, that „Flihgt testing for other purposes (e.g. research) will not be affected by this NPA.

These regulations are applicable to activity of relatively small group of specialists. However, the regulations – as proposed in the NPA 2008 – 17A and NPA 2008 – 20 would be dispersed in several regulatory documents. Such a situation is not comfortable for use and should be avoided

response

Noted

We had to split the requirements for flight test into several parts to fit with the structure that has been agreed for the EASA regulations covering the extension of scope to Operations and FCL.
To ensure consistency, the comments and the resulting text for the various parts have been handled by the same review group.

comment

291 comment by: *Polish Aviation Authority, Aviation Technical Department*

Subjected NPA is proposing mainly harmonization in the group of organizations DOA and POA dealing to aircraft designed according to requirements of CS-25, CS-27, CS-29 and partly to aircraft designed according to requirements of CS-23. Such aircraft are designed and produced mainly by organizations existing several years, in which experience is transmitted in natural manner from generation to generation. Considered NPA only will bring in some positive harmonization.

It looks much more weak in the group of organizations dealing to aircraft more light (remaining part of aircraft designed according to requirements of CS-23 and aircraft designed according to requirements of CS-22, CS-VLA i CS-VLR and others). Many of them have not such a traditions and have not experienced personnel. This mainly applies to organizations which have not yet DOA approval.

In Poland already exist and are observed requirements for flight test personnel, which covers that area as well. Implementing of regulations proposed in NPA 2008 – 20 will be in our case implementing of regulations more liberal and moving responsibility on Aviation Authority dealing certification and making opinions for issuing of Permit to Fly.

Similar situation is dealing to flight test engineers for test flight category 1 or 2 for all categories of aircraft.

It seems to us, that NPA 2008 – 20 should in more detail manner determine principles of performing flight tests also in that second group of aircraft, considering that this group demonstrate high dynamic of growing up and in result the area of danger will be also increasing.

response *Noted*

Aircraft other than CS-25; CS-27/29 and CS-23 above 2 000 kg Maximum Take-Off Mass have been excluded from the scope of this NPA. They will be handled on a case by case basis when issuing the flight conditions associated with the permit to fly or by the FTOM of the relevant DOA or APDOA. This will allow the Agency to gather experience so that best practises can be identified. This will be the subject of a future rulemaking task.

comment *307* comment by: *EADS MAS Flight Test*

4. Our proposed changes to the NPA are equivalent to a large extent to the former German flight test regulations (LuftPersV §§ 99 – 102, etc.) being lifted with introduction of JAR-FCL and never been replaced since.

response *Noted*

Each comment will replied individually.

comment *315* comment by: *SNPNAC*

SNPNAC RESPONSE to NPA2008-20 and 2008-17b

After years of discussions between industry and the JAA (now EASA), it was decided to publish a minimal regulation for Civil Flight Tests in Europe, in the form of an appendix to the subpart P-Permit to fly of the Part 21

The SNPNAC cannot agree with this minimalist approach, which is not in accordance with the ICAO standards in terms of crew licensing.

It is a matter of fact that Article 32 of the Convention on International Civil Aviation states very clearly:

"The pilot of every aircraft and the other members of the operating crew of every aircraft engaged in international navigation shall be provided with certificates of competency and licenses issued or rendered valid by the State in which the aircraft is registered."

The Flight Test Engineer's function onboard an Airbus test aircraft, whether seated in the cockpit or at a specific operational station, can be compared directly to the function of a licensed Flight Engineer. The Flight Test Installation onboard a test aircraft is considered as an essential aircraft system for operation and monitoring all other aircraft systems and has therefore to be operated under the supervision of an operating crewmember.

That is the reason why, especially for the CS 25 certification process, where airplanes have to fly at any point around the world to accomplish the flight test program, Article 32 of the Convention on International Civil Aviation fully applies.

We strongly suggest that a Flight Test Engineer licence be created following the model of the ICAO Flight Engineer licence, as described in Annex 1 of the Convention.

A licence is mandatory for anyone having an operational task throughout the world of civil aviation (private pilots, commercial pilots, airline transport pilots, glider pilots, free balloon pilots, flight navigators, flight engineers, aircraft maintenance agents, air traffic controllers, ….) and it would be very difficult to explain that we expect less from professional engineers operating as crew members onboard aircraft in Flight Test, and crossing the boundaries of international airspace.

Instead of making comments directly into NPA 2008-20, which already has a very convoluted structure and is not the proper place to address crew licence issues, we prefer here to set out the basis of what could become an EASA Flight Test Engineer FCL and comment in the following order:

1) Category of flights
2) Crew qualifications
3) Crew privileges

1) Categories of flights:

With the current definition of CAT 1, 2, 3, and 4 as proposed in NPA 2008-20 which are very deterministic, there is the risk that a given flight test does not fit properly into any category. In this case our understanding of the current NPA is that such a flight would be CAT 2 by default. This would be clarified if we could add in the definition of CAT 2 the additional phrase:

"Any flight that requires specific knowledge of flight test techniques"

2) Crew qualifications

Everything in yellow is an addition to the NPA. We have in the meantime deleted the notion of authorization, which is redundant with the notion of licence.

Flight crew qualifications	**Pilots**	**Engineers**
CAT 1 Rating	**A CAT1 Test Pilot shall:** - Hold at least a CPL in the appropriate aircraft category complete with a CAT1 rating. - Hold a valid Class 1 medical certificate The CAT1 rating is issued by the competent authorities based on a test pilot CAT1 Certificate delivered by an approved training	**A CAT1 Flight Test Engineer shall:** - Hold an appropriate flight test engineer licence comparable to the ICAO flight engineer licence as described in Annex 1 to the convention on International Civil Aviation. This licence must be complete with a flight test engineer CAT1 rating. - Hold a valid Class 2 medical certificate as required for the ICAO flight engineer licence.

	organisation appropriate to the intended aircraft and category of flights, upon completion of a training course of: - 300 hours of ground training, - 90 hours of flight time on a substantial number of representative aircraft featuring different pilot interfaces and handling qualities Credit can be granted by competent authorities taking into account previous experience or training courses To apply to such a training course, the pilot must have previously logged 1500 hours of flight time including 400 hours as pilot in command. The test pilot CAT1 rating is renewed every year by the competent authorities upon completion of a minimum of 20 flight test hours per year. If the rating expires, the applicant shall complete a proficiency check approved by the competent authorities. The validity of the licence is determined by the validity of the ratings contained therein and the medical certificate	The CAT1 rating is issued by the competent authorities based on a flight test engineer CAT1 Certificate delivered by an approved training organisation appropriate to the intended aircraft and category of flights, upon completion of a training course of: - 300 hours of ground training, - 90 hours of flight time on a substantial number of representative aircraft featuring different pilot interfaces and handling qualities Credit can be granted by competent authorities taking into account previous experience or training courses To apply to such a training course, the FTE must have already been trained on basic aviation knowledge. The flight test engineer CAT1 rating is renewed every year by the competent authorities upon completion of a minimum of 20 flight test hours per year. If the rating expires, the applicant shall complete a proficiency check approved by the competent authorities. The validity of the licence is determined by the validity of the ratings contained therein and the medical certificate
CAT 2 Rating	**A CAT2 Test Pilot shall:** - Hold at least a CPL in the appropriate aircraft category complete with a CAT2 rating.	**A CAT2 Flight Test Engineer shall:** - Hold an appropriate flight test engineer licence

	- Hold a valid Class 1 medical certificate The CAT2 rating is issued by the competent authorities based on a test pilot CAT2 Certificate delivered by an approved training organisation appropriate to the intended aircraft and category of flights, upon completion of a training course of: - 150 hours of ground training, - 30 hours of flight time on a substantial number of representative aircraft featuring different pilot interfaces and handling qualities Credit can be granted by competent authorities taking into account previous experience or training courses. When such training is provided in-house, internally appointed senior pilots of the company provide ground training as part of their job. To apply to such a training course, the pilot must have previously logged 1500 hours of flight time including 400 hours as pilot in command. The test pilot CAT2 rating is renewed every year by the competent authorities upon completion of a minimum of 20 flight test hours per year. If the rating expires, the	comparable to the ICAO flight engineer licence as described in Annex 1 to the convention on International Civil Aviation. This licence must be complete with a flight test engineer CAT2 rating. - Hold a valid Class 2 medical certificate as required for the ICAO flight engineer licence. The CAT2 rating is issued by the competent authorities based on a flight test engineer CAT2 Certificate delivered by an approved training organisation appropriate to the intended aircraft and category of flights, upon completion of a training course of: - 150 hours of ground training, - 30 hours of flight time on a substantial number of representative aircraft featuring different pilot interfaces and handling qualities Credit can be granted by competent authorities taking into account previous experience or training courses. When such training is provided in-house, internally appointed senior FTEs provide ground training as part of their job. To apply to such a training course, the FTE must have already been trained on basic aviation knowledge. The flight test engineer CAT2 rating is renewed every year by the competent authorities upon completion of a minimum of 20 flight test

	applicant shall complete a proficiency check approved by the competent authorities. The validity of the licence is determined by the validity of the ratings contained therein and the medical certificate	hours per year. If the rating expires, the applicant shall complete a proficiency check approved by the competent authorities. The validity of the licence is determined by the validity of the ratings contained therein and the medical certificate
CAT 3 authorization	**A CAT3 Test Pilot shall:** - Hold a CAT3 authorization delivered by the agency upon request from his/her organisation and renewed every year based on valid medical Class 1 and a minimum of 20 flight test hours per year. - Hold at least a CPL in the appropriate aircraft category with the relevant type rating if he/she is not CAT1 or CAT2. - Have gained a significant amount of flight experience relevant to the task - Have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness	**A CAT 3 flight crew member shall:** - Hold a CAT3 authorization delivered by the agency upon request from his/her organisation and renewed every year based on valid medical Class 2 and a minimum of 20 flight test hours per year. - Have gained a significant amount of flight experience relevant to the task - Have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness
CAT 4 authorization	**A CAT 4 Pilot shall:** - Hold a CAT4 authorization delivered by the agency upon request from his/her organisation and renewed every year based on valid medical Class 1. - Hold at least a CPL in the appropriate aircraft category with the relevant type rating if he/she is not CAT1 or CAT2.	**A CAT 4 flight crew member shall:** - Hold a CAT4 authorization delivered by the agency upon request from his/her organisation. - Have been appointed in the FTOM by the organisation performing the flight test

	- Have been appointed in the FTOM by the organisation performing the flight test - Have been informed on the change to type design for which the flight tests is to be undertaken	- Have been informed on the change to type design for which the flight tests is to be undertaken

3) Crew privileges

	Pilot	**Engineer**
CAT 1 **Experimental Flights**	PIC: CAT 1 F/O: - Flight envelope opening: CAT 1 - Other flights: CAT 2 or above Derogation for FO can be granted by competent authority on specific cases	Lead FTE: CAT 1 FTE The lead can be performed by a trainee FTE under supervision of a CAT 1 FTE. Other FTE: CAT 2 or above
CAT 2 **Engineering Flights**	PIC: CAT 2 or above F/O: any professional pilot civil or military	Lead FTE: CAT 2 or above The lead can be performed by a trainee FTE under supervision of a CAT 2 FTE.
CAT 3 **Production Flights**	PIC: CAT 3 or above F/O: any professional pilot civil or military	Other flight crew members: CAT 3 or above
CAT 4	PIC: CAT 4 or above F/O: any professional pilot civil or military	Other flight crew members: CAT 4 or above

response

Noted

Please see reply to comment 127.

comment

322 comment by: *Society of Flight Test Engineers*

Overview

Leaders and members of SFTE have been diligently reviewing the NPA and have prepared this comment document in as rapid a fashion as our professional commitments have allowed. SFTE considers the subject matter of the utmost importance, and as such has found it necessary to prudently invest time in the formulation of the Society's comments, responses and recommendations. SFTE wishes to express its thanks to EASA for Agency initiatives to improve safety. SFTE is hopeful that EASA will consider this response document in their deliberations relating to pertinent Notices of Proposed Amendment.

In addition to background information provided herein by SFTE, a number of specific comments to NPA 2008-20 are included at the end of this document, in

a format similar to that of the EASA Comment Response Tool (CRT). It is SFTE's hope that EASA will consider this document in its entirety, and will invite SFTE to further consult on the subject matter.

Background

The Society of Flight Test Engineers (SFTE) has a core interest in the proposed rulemaking as it directly impacts all European members and the profession of Flight Test Engineers in general. Our organization is international and our mission is to advance the flight test profession through communications, networking, standardization, training, and sharing technical information. SFTE also has a vested interest in the safe conduct of flight testing. SFTE's commitment is evidenced in our various symposia, information hosted on our web site and training courses offered by the Society. SFTE also furthers technical and safety goals through interactions with sister organizations such as the Society of Experimental Test Pilots (SETP), the American Institute of Aeronautics and Astronautics (AIAA) and the Flight Test Safety Committee (FTSC). Additionally, we interact with regulatory agencies such as the European Aviation Safety Agency (EASA), the U.S. Federal Aviation Authority (FAA), the civil regulatory agencies of other countries and various military agencies which regulate military products and flight tests.

SFTE wishes to invite EASA personnel to join with SFTE, SETP, FTSC and AIAA at any of our workshops, symposia or conferences to see how proactive these organizations are in improving not only safety but also the state of the art of flight testing. These efforts include the subjects of test preparation & planning, team development, test technique, training, data acquisition, data analysis, reporting, lessons learned and so much more. In particular, the Society of Flight Test Engineers International Symposium for 2009 will be held in Linköping and Stockholm, Sweden, between 7 and 11 September 2009. SFTE invites EASA to join us, engage, and participate in our efforts to improve both the safety and the effectiveness of modern flight testing.

Comments and Response to NPA 2008-20, "Flight Testing"

While SFTE finds the objective of NPA 2008-20 to be well-intentioned, SFTE has significant concern regarding definitions, means of enforcement, and questions the need of some items contained in the NPA. SFTE applauds the requirement for the development of a Flight Test Operations Manual (FTOM) to be maintained and observed by Testing Organizations, and agrees this item will likely achieve an improvement in flight test safety.

Of concern to SFTE, EASA NPA 2008-20 utilizes the term "Flight Test Engineer" without specific description of which ***type*** of Flight Test Engineer the NPA is intended to apply to. There are many different levels and specializations of Flight Test Engineer. While it might be inferred that EASA and the NPA are referring to the "Test Conductor" (or FTE who has direct interface with the Test Pilots during flight testing) SFTE is of the opinion that this is not defined sufficiently in the NPA. It would be cost prohibitive to further testing if it were necessary for each and every engineer that supports a flight test to be a graduate of the suggested forms of education; in most organizations, a safe and cost effective team is formed with support from staff with basic engineering or aeronautical education augmented by organization specific flight test training.

The language and content of NPA 2008-20 tends to suggest that to improve flight test safety, it is necessary that Flight Test Engineers and Test Pilots be graduates of "a specific training course approved by the Agency." Conversely,

SFTE believes that given appropriate training from a variety of sources (e.g., company and/or model specific training), leveling requirements for Flight Test Engineers to have completed such a course or a short course is not necessary, and may be counterproductive with respect to safety, efficiency and test quality. It should be noted that SFTE recognizes the value and importance of education and training from a number of recognized and distinguished Test Pilot Schools and other institutions offering a variety of courses relating to Flight Testing. SFTE recognizes that it is extremely beneficial for a ***portion*** of a Flight Test Team to include graduates from such institutions; in many cases this may not be necessary or economically viable and these courses may not provide adequate training for very specialized flight test tasks. SFTE advocates a proposal to provide ***recommendations*** for experience and education and specific training ***guidelines*** as part of the Flight Test Operations Manual requirement. To assist with developing recommendations for experience and training of FTE's (of various types), SFTE is currently surveying the industry to collect and develop industry training guidance for members of this profession. While SFTE recognizes that completion of "a training course accepted by the Agency" is one of many valuable tools available to Flight Test Organizations, it is not the only tool and should not be required for testing ***of any category***. Similarly, it should not be relied upon as the sole means of enhancing flight test safety.

In the text accompanying the NPA, EASA suggests that the flight test accident analysis "supports the need for appropriate requirements for flight test crew competence and experience." SFTE begs to differ: if consideration is taken for the risks and nature of flight testing, it can be argued that the accident rate is relatively low compared to those of flight training and even normal air carrier operations. Taking a truly historical look at flight test accidents, it can be seen that flight test accident rates are dramatically reduced from those of the era around 1945 to 1960, when organizations such as SETP and SFTE were formed with the stated purpose of improving flight test safety along with the science, equipment, techniques and art of collecting flight test data. The more recent advent of the Flight Test Safety Committee (jointly formed by SETP, SFTE and AIAA) and its current popularity demonstrate the dedication of both the industry and the societies that support the industry. All three organizations currently offer timely training activities, fully supporting their objectives of enhancing the art, science and profession of flight testing. SFTE strongly supports the development of ***recommendations and guidelines*** for the training of FTE's of various types, but is opposed to a mandate for completion of courses for which requirements are yet to be defined.

NPA 2008-20 does little to recognize the contributions of currently practicing FTE's who are ***not*** graduates of accredited Test Pilot Schools; some of these highly competent individuals have been safely and efficiently practicing the art and science of Flight Test Engineering – many of them developing course material and even ***instructing*** at recognized and effective test pilot schools. The NPA does not acknowledge that a practicing FTE may be more competent and safer than a recent graduate of a recognized TPS or short course. Instructors from internationally recognized Test Pilot Schools point out that the content of long courses do not offer highly training for highly specialized testing. While a graduate of such a course may contribute to safety of such testing, a non-graduate with specialized experience and training is generally preferred on test teams.

SFTE is concerned that the NPA does not set standards for such specific training courses ***prior*** to leveling a requirement for completion of such courses.

Similarly, how institutions (or their instructors) become recognized and/or accredited to offer such training is not defined in advance of requirements for attendance. The NPA does not adequately address the economic and schedule impact of a test organization having to schedule and enroll FTE's in recognized TPS institutions. Additionally, the NPA does not recognize the migratory nature of FTE's who may move from one test organization (employer) to another, or the many competent consultant FTE's who serve multiple test organizations. There is measurable advantage to this "cross pollination," namely the sharing of lessons learned through the industry (a benefit promoted by organizations such as SFTE, SETP, AIAA, FTSC and others). NPA 2008-20 as written would have a detrimental effect on the sharing of lessons learned (and hence a detrimental effect on safety): experienced/grandfathered FTE's would be dissuaded from leaving their existing employer and losing their grandfathered status as experienced FTE's.

SFTE is concerned that the implementation proposed by the NPA does not reflect that the state of the art and science of Flight Test Engineering is still rapidly advancing, and TPS curricula tend to be focused mainly on the basics and are oftentimes focused on military applications with little regard to civilian flight test requirements, techniques and considerations. Test organizations employing the state of the art are better able to rapidly train for the these advanced (and sometimes model specific) methods, whereas curricula at the Test Pilot Schools take some time to develop and frequently are established years in advance. While the NPA notes the undisputed benefit of TPS training, it does not recognize that there are highly specialized aspects of the various FTE sub disciplines (e.g., avionics, flying qualities/handling qualities, performance, stall characteristics/speeds, systems and sub-systems), and these disciplines require specific training and preparation beyond what may typically be covered even in a TPS Long Course.

Recommendation from the Society of Flight Test Engineers

SFTE proposes that instead of requiring certification and matriculation of FTE's from recognized test training institutions, EASA establish guidelines and recommendations for ***education, experience and training***, appropriate to the tests being conducted. SFTE recommends that various Test Organizations would optionally incorporate these guidelines in either their Operations Manuals, test planning documents or training regimens. Numerous Test Organizations already have highly effective, well thought out and meticulously developed training curricula. It is likely more effective for an organization to adapt its existing training program to EASA and/or Industry recommendations than to enroll its staff in one of the few recognized TPS institutions. SFTE is currently in the process of surveying the industry to assess the state of the various Test Organizations. SFTE plans to gather data and comments from the industry (including regulatory agencies and military organizations) and publish recommended training syllabuses, recommended experience and recommended certification (e.g., Engineering Degrees, private/commercial/ATP pilot ratings) for FTE's to perform specific tasks and tests.

SFTE recommends that EASA develop requirements for approved courses and schools prior to leveling any requirement for Flight Test Engineer or Flight Test Pilot attendance.

SFTE Notes that the United States Federal Aviation Administration (FAA) has FFA Order 4040.26A "Aircraft Certification Service Flight Safety Program" which requires testing organizations to establish, among other things, a Flight Test Risk Management system. SFTE proposes that EASA establish recommended

guidelines for experience and training of test team members in a guidance document such as Order 4040.26A, or Advisory Circular Material (e.g., AC/AMJ 25-7).

Summary

The Society of Flight Test Engineers recognizes the practical, financial, and justification issues associated with controlling FTE training. While the SFTE endeavors to advance its professionals' development through formal training of all lengths, we also fully recognize the value of customized in-house training and on-the-job experience. We believe it should remain the sole jurisdiction of the test asset operator to pass final judgment regarding who is qualified to serve as an FTE in any capacity.

The NPA background information reveals that during the course of its research of flight test accidents, it uncovered no more than three cases where aircrew training may have been a contributing factor. With some assistance from professional societies such as SFTE, SETP and the Flight Test Safety Committee, the industry has shared lessons learned from many of these accidents, and developed the ability to educate, train and expose test crews to environments that specifically prepare them for the hazards of flight testing. The flight test accident trend has shown dramatic improvement since the 1970's. This is indeed helped by the presence of graduates of the Test Pilot Schools mentioned, but much of the test team brings experience to the table that is not (and in all likelihood, ***can not be***) developed in these fine institutions. In short, the current system works as is, without the need for approval by a competent authority.

The Society of Flight Test Engineers is currently working with other flight test organizations to recommend guidelines for training FTEs. This paper's description of various FTE job functions make it clear that training can be equally specialized, thereby reducing the training burden on any organization. These guidelines will assist flight test managers towards planning and justifying training and will hopefully guide the curriculum of the various flight test schools. SFTE believes that these guidelines should always be just that and not interpreted as rules.

SFTE fully supports the industry request to ease the mobility of FTEs between projects and countries, but SFTE believes that the burden for determining qualification belongs with projects and test organizations, not a government authority. The forthcoming FTE training guidelines will be written with this request in mind and should serve as a foundation for FTE acceptance while still allowing each organization its own path, and flexibility to adapt at a pace that serves the advancing nature of the industry and the advancing trend in flight test safety.

Terminology

SFTE is of the opinion that some terminology needs to be more accurately defined than is done in the NPA. Significant confusion results without clear understanding of the functions served by the FTE community. SFTE urges the NPA terminology be adapted accordingly to meet existing international norms and avoid confusion or misunderstanding.

SFTE wishes to point out that there are many different forms of Flight Test Engineer, with many different specializations. The NPA is vague as to which type of FTE would fall under the proposed regulation. Was the intention to impose requirements on the background of the Test Conductor or Test Director

specialization of FTE? The TC or TD is loosely defined as the Flight Test Engineer who is interacting directly with the pilot(s), either on board the aircraft or in the control/telemetry facility. SFTE notes that many different engineers performing various duties (onboard and off board aircraft) develop experience working with Test Pilots and Test Conductors. For many of these engineers – with varied background that enhances their knowledge and skill – building this experience serves as training leading to Test Conductor/Test Director skills and duties. SFTE would like for EASA to recognize this on the job training to be of similar value compared to an approved course, and grant privileges based on experience without a need for formal flight test education.

While each organization traditionally retains internal authority to define tasks, job positions, procedures, etc. as they like, SFTE suggests that the following descriptions of titles and job functions may help avoid confusion, and lead to further meaningful discussion. Similarly, reviewing this terminology will highlight that many different FTE skill sets are required to form an effective Flight Test Team.

Flight Test Engineer (FTE) is a relatively broad title applying to those working in almost any engineering capacity in flight test. In practice, degreed or highly experienced individuals working in technical areas not more specifically defined (e.g. test pilot, instrumentation engineer) wear the "FTE" title. As evidence, associate membership in the SFTE requires current engagement in flight test engineering plus either a technical degree from a recognized institution, a non-technical degree with two years engineering experience, or more than four years flight test engineering experience. Full membership simply adds more years of general flight test experience to the above. SFTE's long-standing tradition of broad FTE recognition is founded on our experience with a wide variety of organizations.

Under the umbrella of the FTE title lie a variety of job functions. The commonly recognized functions described below fall out from grouping certain tasks together. While SFTE recommends these descriptions, each organization may arrange tasks and job functions as appropriate to its needs and skills. An FTE may work in any number of the following functions.

Primary FTE (a.k.a. Flight Observer) is a job function encompassing tasks related to planning a particular mission, coordinating & recording its execution, and ensuring proper post-flight reporting. The Primary FTE function may be assigned on a per-flight basis or may be regularly assigned to a person attached to a particular aircraft. A Primary FTE is technically qualified for the discipline(s) evaluated during the assigned flight, but does not necessarily have complete knowledge of all disciplines or aircraft operations. Pre-flight tasks may include detailed mission planning such as checking weather, instrumentation, equipment & conformity, and writing test cards. Depending on the mission complexity and support, this function may also include responsibility for taking the primary flight notes. When a Test Conductor is not needed, the Primary FTE coordinates with the pilot-in-command (PIC) to jointly control the mission execution. This execution task may be accomplished from the test aircraft, chase aircraft, or ground station. For any assigned flight, the Primary FTE core task is ensuring technical validity of planning & procedures before and during test execution, then communicating the data and/or results to appropriate analyst. The minimum flight test crewing assignment usually requires a test pilot and Primary FTE function, regardless of where the latter sits during the execution.

Test Conductor is a job function encompassing tasks related to leading real-time test execution where it does not impact the normal PIC authority. Unlike Primary FTE expectations, the TC should have broad knowledge of all test disciplines and aircraft operations. This function begins at the pre-flight briefing and ends at the post-flight briefing. The TC controls the test by collating real-time information from displays and/or supporting FTEs; his knowledge of aircraft procedures, systems, and limitations; and the current flight situation. The need for a TC on any test depends on its risk level and the aircraft & mission complexity. A Test Conductor is not required on simple missions that can be handled by the Primary FTE. When used, the TC function includes conducting normal communications with the PIC during test execution. An FTE or test pilot may function as the TC from a properly equipped test aircraft, chase aircraft, or ground station.

Operations Engineer is a job function used encompassing those tasks associated with near-term planning (approx 2-week) of flight test operations for one or more test assets. Typically this FTE is concerned with detailed tactical scheduling of maintenance, modifications, inspections, instrumentation work, airspace, ground equipment & special aircraft equipment, and air & ground crew support. Ops engineers maintain constant knowledge of aircraft status, configuration, and near-term plans. The ops engineer involvement goes at least as far as preparing all items in the test plan and confirming planned aircraft configuration & conformities. Ops engineer involvement may extend to selecting tests based on program priorities, writing test mission cards, preparing weather data and briefing missions. This function essentially ends when the pre-flight briefing is complete.

Test Director is a job function encompassing tasks related to monitoring real-time test execution. This monitor function normally applies to highly complex or high risk test missions where the TC or PIC may potentially become too involved in any immediate situation or need additional authority for making program-related decisions. When used, the Test Director function includes monitoring all operations but not normal communications with the PIC during test execution. A qualified FTE, test pilot, or flight test manager may function as the test director from a properly equipped ground station.

Aircraft Coordinator (a.k.a. Scheduler) is a job function encompassing strategic planning tasks. This FTE principally considers and schedules long-lead items to meet the organization's testing milestones. This includes synchronizing major & minor test campaigns with planned maintenance & modification and aircraft capability. By advance planning & tracking progress on details such as work orders, functional test procedures, and configuration/conformity requests, the aircraft coordinator ensures any test asset modifications are properly coordinated to minimize down time. The aircraft coordinator typically transfers near-term scheduling responsibility to the Operations Engineer about 2 weeks before planned testing.

Basic FTE (a.k.a. discipline FTE) is a job function encompassing, as a minimum, all required but not otherwise assigned FTE tasks within an organization. This catch-all definition allows an organization to customize its other job function tasks and still ensure full coverage. Beyond providing general data reduction and troubleshooting support, a Basic FTE is typically assigned flight test responsibility for one or more test disciplines (e.g. environmental control system, ice protection, radar). With each assigned discipline comes the responsibility to support development or acceptance testing via the following tasks

a) Serve as the flight test subject matter expert with detailed knowledge of function, acceptance criteria, critical test conditions, etc.
b) Write exhaustive test plans jointly with certification/acceptance engineers and guide them through approval processes.
c) Track progress and validity of required flight test instrumentation and special test equipment.
d) Prepare data analysis tools and reduction process appropriate for trouble shooting and reporting.
e) Ensure individual and collective test points are accomplished in a timely manner and according to plan and ensure their status is tracked.
f) Support testing during test flight and pre-briefs & debriefs as appropriate.
g) Serve as principle handler or analyst for flight test data and pertinent ground test data.
h) Communicate test results and work jointly with design engineers to generate follow-up actions for additional testing or reporting.
i) Prepare development and certification flight test reports and guide through final approval.

Data Analyst is an FTE job function encompassing tasks related to real-time or post-flight analysis or simple data reduction. This is a subset of the Basic FTE job function described above and may also include post-flight reporting. Some organizations remove analysis & reporting tasks from the Basic FTE function or reduce their workload with some data analyst support.

Technical Aide is a job function encompassing routine support for any FTE, but not responsibility for tasks requiring an engineering capacity. While the holder of this job function is by definition not an FTE, SFTE recognizes the potential of Technical Aides to become FTEs with ample experience and training.

Note: The above job functions are defined without regard for flying in test aircraft. Any of these functions may be performed by flying or non-flying FTEs. Qualifications to fly as an FTE are driven by technical competence appropriate to the testing, flight training, and medical qualification.

All of the above tasks are necessary to carry out a proper test program. Some of the above job functions are time-limited or may be appropriate only for certain levels of test complexity. There may be any combination of individual FTEs assigned to multiple functions. Organizations may engage all the above functions as written or substantially rearrange them as desired. For the purpose of the NPA discussion training recommendations, the job function descriptions above provide a more precise language for discussing FTE training and qualifications.

Society of Flight Test Engineers (SFTE) A professional society with the stated objective of advancing the art and science of Flight Test Engineering, as applied to aerospace vehicles, through communication among individuals, both domestic and international, in the allied engineering fields of test operations, analysis, instrumentation and data systems. SFTE maintains a web site (http://www.sfte.org) with valuable information (some available freely, other reserved for members), including technical papers, forums, a technical expert data base and more.

Society of Experimental Test Pilots (SETP) An international professional society which seeks to promote air safety and contributes to aeronautical advancement by promoting sound aeronautical design and development, interchanging ideas, thought and suggestions of the members and assisting in the professional development of experimental pilots. SETP maintains a web site (http://www.setp.org) with valuable information (some available freely, other reserved for members), including technical papers and operational procedures.

American Institute of Aeronautics and Astronautics (AIAA) A professional society with the stated objective of advancing aerospace science, engineering and technological leadership. www.aiaa.org

Flight Testing Technical Committee, American Institute of Aeronautics and Astronautics (AIAA-FTTC) A subcommittee with the stated objective of advancing the art and science of flight test technical methodology, promoting the requirement for flight testing, promoting the importance of flight test in the discovery process, emphasizing research which uncovers physical phenomena, promoting excellence in flight testing, expressing positions on appropriate flight testing issues, promoting the interchange of ideas in the flight test community, disseminating information and test techniques that augment the body of knowledge and enhance the safety of flight testing, and to promote flight test engineering as a field of study and professional career option. http://www.aiaa.org/portal/index.cfm?GetComm=62&tc=tc

Flight Test Safety Committee (FTSC) A professional committee formed from members of SETP, SFTE and AIAA with the purpose of promoting Flight Safety, reducing the risk of mishap, promoting risk reduction management and continually improving the profession's communication and coordination. FTSC hosts annual Flight Test Safety Workshops (FTSW) in Europe and North America where information relating to safety is freely shared in an environment of non-attribution. FTSC has a web site with useful information (including best practices noted in EASA NPA 2008-20, a data base containing flight test related data collected from the industry): http://www.flighttestsafety.org . FTSC has for years sought to develop a certification for the Flight Test Safety Professional, and is currently offering Continuing Education Units (CEU's, underwritten by accredited universities) for workshop and tutorial participation.

Flight Test Safety Workshop (FTSW) Annual Workshops hosted by FTSC held at varying locations in Europe and North America where safety is promoted through communication, dialogue and sharing of lessons learned. Presentations which do not contain sensitive company information are posted on the FTSC web site (http://www.flighttestsafety.org/workshops) when authorization is provided by the presenter and/or company.

response *Partially accepted*

The Agency appreciates the effort put into defining the various functions. However, qualifications will be only defined for the so-called lead Fight Test Engineer:
a flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities.

This function called 'lead FTE' in the amended NPA addresses only a very small

subset of all FTE functions that SFTE has listed; whereas the so-called 'lead FTE' training shall be regulated according to this NPA because of his potential direct in-flight interference with the aircraft schedule and/or even critical systems, all the other FTE will be managed only through the operator FTOM, describing competences and duties according to their operations principles. It shall be noted that nothing changes for the vast majority of FTE having regular duties in flight tests.
In addition, the clear fact that a so-called 'lead FTE' is not mandatory for flight test has been lengthily discussed and accepted by the flight test group members. This specific function, not in force in all flight test organisations within Europe, is not considered as mandatory for any test category; however it is considered to require mandatory training to personnel having to perform these specific 'lead FTE' duties.

SFTE shall consider that not all FTE, as thoroughly defined by SFTE, but only the small subset are impacted by the training mandatory requirements of this NPA.

comment *323* comment by: *Society of Flight Test Engineers*

Affected Paragraph: General Comment

Concern from SFTE: The requirements for Flight Test Engineers to "have satisfactorily completed a specific training course accepted by the agency" and/or to "have gained a significant amount of flight experience relevant for the task" are unnecessary, are costly and will not appreciably contribute to flight test safety.

Justification: The NPA training requirements, if implemented, will reduce the ability of test organizations to provide mission specific training to FTE's, set specific Test Organization guidelines for training and/or experience. SFTE suggests that the Agency develop recommendations and guidelines for experience and training of FTE's, to be included in the Flight Test Operations Manuals of Flight Test Organizations, and that said organizations have flexibility in establishing internal guidelines and requirements for FTE's. This will allow timely development of training for specialized flight test tasks and will provide a better contribution to flight test safety than the generalized curricula offered by the yet to be identified "specific training course accepted by the Agency."

response *Partially accepted*

The review group agreed that a minimum amount of training should only be required for lead FTE in category 1 and 2.
Other flight test engineers shall have the amount of experience and training commensurate to the task assigned to them and in accordance with the FTOM.
See also answer to comment 322.

TITLE PAGE p. 1

comment *31* comment by: *Police Aviation Services*

Police Aviation Services Ltd - Comments on EASA NPA 2008-20, "Flight Test"

●1. Comments on NPA Presentation
The presentation of the information and the writing style make it more difficult

than it needs, or should, be to assimilate the NPA content.
There should be consistency of terminology within the document. In section B, the proposed Appendix XII to Part 21 contains a table defining flight test crew competence. In the "CAT 1" column against CS-25 etc. aircraft, the text states "....completed a specific training course accepted by the Agency.". In section C, the proposed AMC to Appendix XII purports to quote this same text, but does so incorrectly as follows. "...completed a specific training course approved by the competent authority.".

●2. Comments On NPA Content

●2.1. General Comment

It is clear that the NPA has been written with large OEMs and major air transport operators primarily in mind. This is particularly clear from the proposed Guidance Material to Category 4 flight tests defined in proposed Appendix XII to Part 21.
Consequently, the effects of the proposed new regulations on small third party approved organizations holding a DOA and often a POA who modify (Change) aircraft and hold STCs, are unnecessarily onerous. Such organisations conduct the majority of their work on aircraft certified to CS-23 and CS-27 (or equivalent).

●2.2. Existing UK Situation for Third party Modifiers

In the UK, such organisation often hold formal flight test approvals overseen by the UK CAA which allow flight testing for development and compliance showing purposes. To qualify for such an approval, the Organization must demonstrate attributes, many of which are similar to those described in the NPA. These attributes include:
Organization structure and inter-department coordination.
Flight test procedures (manual or handbook).
Flight Crew competence (evaluation and appointment).
Risk management (Identification of potential hazard and hazard mitigation for a particular flight test or series of flight tests).

- Documentation. (Flight test plans, Flight test reports, aircraft clearance form).

Flight testing has been carried out by these Organizations for many years and the activity has a good safety record which has been achieved with a much more proportionate and flexible regulatory framework.
The NPA does not publish details of the two safety reviews that were conducted, so it is not possible to make definitive comment, however it is believed that the majority of the accidents catalogued, possibly the vast majority, occurred to flight tests that would fall into Categories 1 and 2 as defined in the NPA.
Much of the flight testing conducted by third party modifiers would fall into Category 4 as defined in the NPA.

●2.3. Impact of the Proposed Regulations on Third Part Modifiers

The proposed Regulation will have a detrimental impact on third party modifiers in two areas. For third party modifiers, these two areas are linked. They are:
Provision of Flight Test Engineers.

- Category of Flight Test definitions.

Both of these aspects of the proposed Regulations will add significant cost

burdens, but without a commensurate increase in safety. Because of the existing Regulatory regime and attributes of these Organizations, the safety level is already high, and the additional attributes which would be imposed by the two criteria noted above would not improve it automatically.

●2.4. Provision of Flight Test Engineers

The evaluation and appointment of flight test aircrew is currently carried out by the approved Organization in accordance with procedures contained in the Organization's Flight Test Manual (Handbook or Exposition). This is approved by the Regulator (UK CAA), and so always achieves an appropriate standard. Whilst there are no formal criteria for any flight test crew (pilots and engineers/observers), it is accepted de-facto that all pilots conducting flight test of a more challenging nature, typically experimental or beyond the already proven flight envelope, must be suitably trained in flight test and be appropriately experienced.

There is no such de-facto requirement for flight test engineers/observers. Instead, they are selected, usually from the Organization's existing staff based on their individual competencies, the requirements of particular flight tests or types of flight test, and the approved procedures. Consequently, the cost to the organization is low.

Under the proposed Regulations, any flight testing to be conducted in Category 2 would require new (not grandfathered) flight test engineers to undergo a "short course" as defined in the proposed AMC to Appendix XII of Part 21. Against the negligible safety benefit compared with current flight testing, the associated costs would be unnecessarily burdensome. It is recommended that the more 'fit for purpose' approach historically applied to UK flight test organisations be applied by EASA. This would demand an appropriate level of personnel expertise as befitted the test flight to be carried out.

●2.5. Category of Flight Tests Definitions

The rationale behind categorising flight testing is understood. It is further understood that it is a difficult task to apply effective definitions to the Categories, as is recognised by the NPA regarding to difficulty and inadvisability of giving each Category a title.

However the definition of the Categories as proposed by the NPA imposes unnecessary cost burdens upon third party modifiers, mainly because of the proposed need for new Category 2 flight test engineers to undergo a "short course" of training. As noted in the general comment (2.1) above, it appears that the focus of thought for category definitions has been large OEMs and large air transport operators, to the detriment of third party modifiers dealing mainly with CS-23 and CS-27 aircraft.

The proposed Guidance Material to Appendix XII of Part 21 attempts to clarify the boundaries between Category 2 and Category 4 flight tests. As currently written, this means that the range of flight tests conducted by third party modifiers will be split between the proposed Category 2 and the proposed Category 4, with the majority in Category 4. In order to continue with current activities in the longer term, such Organization will need to incur the costs associated with new flight test engineers described in "Provision of Flight Test Engineers" (2.4) above.

Further, the boundary definition appears illogical. "EGPWS and TCAS" are included in Category 2. Yet compliance showing and functional efficacy checking of such equipment, which is designed specifically for flight safety enhancement and approved, is a low risk activity more appropriate to the apparent definition of Category 4.

The definition given for Category 4 appears to address only large transport aircraft. The suggestion that "The majority of these flights are conducted to

check EMI only." is of concern because equipment such as cabin entertainment systems are generally less rigorously bench tested than EGPWS and TCAS. The EMI effects of such systems (entertainment systems) might be less well understood and could have an effect on a Fly-by-Wire, EFIS, and FADEC equipped aircraft which could, in the extreme case, be catastrophic. Consequently there is justification for arguing that flight tests such as these should be within the Category 2 definition.
The explicit inclusion of EGPWS and TCAS in Category 2 implies that flight testing of Mode S transponder installations is also in Category 2. As with EGPWS and TCAS, this is considered to be low risk and more appropriate for inclusion in Category 4. With the mandatory introduction of Mode S transponders, its inclusion in Category 2 will impose the same flight test cost burden with negligible safety benefit as described above. This could have a massive economic impact, particularly at the lower end of the market.

●3. Conclusions
The requirement for new (not grandfathered) Category 2 flight test engineers to undergo a "short course" of training will be unnecessarily burdensome when set against the negligible safety benefit.
The requirements for flight test pilot and flight test observer 'qualifications' are too rigid and obviously aimed at the likes of Airbus and Boeing; they are not appropriate for third party modifiers. In particular the criterion to be applied to the crew for 'lesser' flight tests (i.e. other than first flights of new aircraft types and the like) should be made more proportionate and should allow organisations more latitude in how they show that they are using suitably qualified crews.
The definitions of the boundary between Category 2 and Category 4 flight testing are incorrect and require further work.

●4. FINALLY
It seems that this NPA was written by, and had input mainly from, graduates of the various test pilots and flight test observers schools e.g. ETPS. Whilst this level of expertise is appropriate for the first and subsequent certification flights of new aircraft types it is manifestly not appropriate to apply this level of training, expertise and regulatory rigidity across the board to all types of flight test activities.
The current NPA would not appropriately regulate the flight test activities for much of the European aerospace industry and needs revision before it can be made law.
As someone who has been involved in flight testing by both third party modifiers and Type Certificate holders for nearly twenty years I would be only too pleased to contribute to a renewed discussion on this very important regulatory area.

response

Noted

1 Comments on NPA Presentation
The text of the changed text will be made consistent

2. Comments on NPA Content
2.1. General Comment
The comments were reviewed with a review group incorporating Industry and Flight Test training Schools. The Agency believe that the resulting minimum standard is acceptable

2.2. Existing UK Situation for Third party Modifiers
These requirements should put the commentator in a good position to comply

with the requirement to have a Flight Test Operations Manual

2.3. Impact of the Proposed Regulations on Third Part Modifiers
2.3.1 Provision of Flight Test Engineers
Please see response to comment 322
2.3.2 Category of Flight Tests Definitions
Extensive guidance material has been produced to clarify the boundary between category 4 and category 2

3. Conclusions
Please see replies above.
4. FINALLY
The Agency thanks the commentator for his offer to help.

comment

185 comment by: *Swedish transport agency, Aviation department*

The Swedish Transport Agency, Aviation Department (Swedish CAA) is supporting this NPA, and has no further comments to it.

response

Noted

The Agency thanks the commentator for his support.

comment

230 comment by: *Boeing*

Boeing Commercial Airplanes

General Comment:
Boeing currently performs many test/verification flights. Pilots conducting these operations are trained and qualified by a variety of internal methods. We consider that this internal training is appropriate and adjusted to meet Boeing's test pilot training needs and operational requirements. The proposed EASA requirement to be a graduate of a formal test pilot school is impracticable, expensive, and unnecessary. Test pilot schools' courses are typically crafted to meet military requirements and some of these schools may choose not to meet EASA's course approval criteria requirements.
The NPA's training requirements, if implemented, will severely limit Boeing's ability to conduct test flights in Europe or on European-registered aircraft, and will introduce an unneeded additional layer of industry oversight. Flight test training needs can be met in several ways and should not be specified by EASA. This non-specified approach is cost-effective and focuses organizational training resources on specific tests on specific models of aircraft as needed. Harmonization of flight test training is not practical in all cases, and we maintain that it should not be an EASA goal.

response

Noted

The Agency believes that harmonisation of flight test requirements in Europe was needed. Using a review group where Industry and Flight test Training schools were represented, the Agency considers it has achieved an acceptable minimum standard. This standard provides for a gradation of requirements taking into account the complexity of the test and the complexity of the aircraft. In addition, small aircraft have been excluded from the applicability of the changed text.
For the applicability to third countries of the NPA please see the reply to comment 110.

A. Explanatory Note - I. General p. 3

comment *33* comment by: *ADAC Luftfahrt technik*

General remarks

In our opinion NPA No.2008-20 once again is proving our general view, that EASA rules and regulations are being made for the big manufacturers and operators and do not regard the very different requirements and problems of smaller organisations and do not regard the very different technical background of the types, sizes and usage of the aircraft to be modified.

The result of this rule, like the one of others before, will be, that small and medium design organisations will not be able anymore to create the personnel and competence resources to comply with the constantly rising level and extent of EASA rules and regulations.

If this unsound tendency will not be stopped in the very near future, consequently design work will be taken away from small and medium organisations to large companies and TC holders.
In addition it will make even small changes to aircraft too expensive and as a result only equipment, which is mandatory, will be installed.

This does not only mean the decline of Know-How in the field of design work and the monopolizing of work by the TC holders, but also is threatening the existence of small and medium DO's, which we are not willing to accept !

response *Partially accepted*

The approach chosen by the Agency is to define a minimum standard so that risks are appropriately managed.
The applicability of the proposal is limited to CS-25, CS-27/29 and CS-23 above 2 000 kg maximum take-off mass.
4 categories of flight test with requirements adapted to each category have been created.

comment *200* comment by: *NAA-PL*

General Comment

Our opinion presented below concerns only problems connected with test flights performed to achieve information regarding flight characteristics, condition of aircraft and their elements and equipment.

Polish Aviation Authority has participated in works of the JAA Working Group that acted in years 2000 to 2002 as so called the Flight Test Working Group. Therefore we would like to express our satisfaction that proposals elaborated by that Group have been partly used in the published NPA.

We remember also, that the first proposal of that Group was to elaborate single separate Part of JAR regulations called JAR FT containing in one document all regulations concerning flight testing on all stages of the process from research and development flights, through certification flights, production flights and flights connected with replacement of equipment which have not influence on performance and flight characteristics, and also check flights during operating

and maintenance. Our Authority has supported such an idea.

Now In Poland we have national regulations concerning flight testing based on propositions elaborated by the JAA Flight Test Working Group.

After joining the EU up to now we obtained already:

1) COMMISSION REGULATION (EC) No 375/2007 of 30 March 2007 amending Regulation (EC) No 1702/2003 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 organizations. This Regulation implements new Subpart P – Permit to Fly.
2) 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
3) Recently we obtained **NPA 2008 – 17** and **NPA 2008 – 20**.
4) The NPA 20 contains announcement of additional regulations on Part Management Systems (regarding Training Organizations) and the information in paragraph 22c, that „Flihgt testing for other purposes (e.g. research) will not be affected by this NPA.

These regulations are applicable to activity of relatively small group of specialists. However, the regulations – as proposed in the NPA 2008 – 17 and NPA 2008 – 20 would be dispersed in several regulatory documents. Such a situation is not comfortable for use and should be avoided.

response *Noted*

We had to split the requirements for flight test into several parts to fit with the structure that has been agreed for the EASA regulations covering the extension of scope to Operations and FCL.
To ensure consistency, the comments and the resulting text for the various parts have been handled by the same review group.

A. Explanatory Note - II. Consultation p. 3-4

comment *37* comment by: *Austro Control*

The comment period should be extended, because some related documents are included in other NPA's e.g. NPA 2008-22c and Part FCL. The comment period should therefore be the same as on the related documents.

response *Accepted*

The comment period was extended to fit with the one for Part-FCL.

A. Explanatory Note - IV. Content of the draft decision - para 8 and 9 p. 4-5

comment *1* comment by: *European Sailplane Manufacturers*

The European Sailplane Manufacturers do appreciate the effort of the Agency to look also into the safety of flight testing and to harmonise regulation in that

field also.

Flight testing indeed is a demanding part of aviation and of aircraft development.

Any manufacturer looks very close into the regarding aspects and this is certainly true for large transport airplanes as well as for sailplanes.

Nevertheless - as on many other occasions - a word of caution is needed here:
Even if this NPA states that a "one shoe fits all" approach is not preferred, again the tendency is here to introduce additional burden and new regulation for the General Aviation sector.

In principle every effort to increase safety is appreciated but introduction of new approval processes (e.g. additional manual for organisations) or required costly training can have even negative impact:
as soon as we are talking of small organisations with very limited ressources these burdens limit the possibilities of these manufacturers to prosper (and to conduct safe and efficient flight tests).

Therefore the saiplane manufacturers propose:

a) do clearly exclude "small" categories from this new regulation - already ELA definition is existing from the MDM.032 process and such aircraft categories should be outside of the scope of this NPA

b) do not make it even more difficult for the typically very small companies in the ELA sector - they do not need further regulation and no one claims that they have a safety problem in the flight tests regime

c) please offer more information - this support would be really efficient as the persons concerned are always eager to improve and learn but not to concentrate more and more to administrative and regulatory work.

response *Partially accepted*

Only CS-25, CS-27/29 and CS-23 above 2000kg aircraft have to comply with the requirement for qualifications for flight test crew.
However, the flight test operations manual is mandatory for holders of DOA, POA or APDOA. It may be a stand-alone document or be included into existing document. It will then define the qualifications of the flight test crew for aircraft that do not need to comply with the requirements for qualification as defined in Part-21.
In the case the applicant does not have an APDOA, a DOA or a POA, the test crew requirements will be included in the flight conditions.

comment *14* comment by: *Bernhard Zinser*

Comment 1:

The Experimental Flight Rating Class 2 (TB2) formerly issued by the German Luftfahrtbundesamt (LBA) included flight tests analogue to Condition 2 as outlined by NPA 2008-17B.

The applicant for an Experimental Flight Rating Class 2 did not necessarily have

to fulfil a "training course" as mentioned in NPA 2008-17B. Regulations also offered the option of **theoretical and practical instruction by an active test pilot for at least 12 months** according to a detailed syllabus published under the guidelines **of** the German Ministry of Transportation. Another compulsory requirement was the Aerobatic Rating.
In addition to the above**,** the applicant had to:
(1) pass a theoretical knowledge examination at the authorities (LBA)
(2) demonstrate his skills in a practical flight test task in front of an assigned instructor test pilot (holder of an Experimental Flight Test Rating (Class1)).

Overall, an applicant for an Experimental Flight Rating Class 2 had to demonstrate the **same or even a higher degree of knowledge** than a "training course at an approved training organization" (Condition 2) as proposed by NPA 2008-17B.

Taking into account **qualification of Experimental Flight Rating Class 2 and legal protection of possession / status, Part-FCL regulations** shall be changed **to contain**

- the **continuation** of the Experimental Flight Rating Class 2 or a comparable rating, or at least
- an **acknowledgment / acceptance** of the Experimental Flight Rating Class 2 as "training course at an approved training organization" (Condition 2) according NPA 2008-17B.

This would also reflect the often cited "grandfather law" in NPA 2008-20.

Comment 2:

Approved training courses or training organizations might loose approval in the long term. In such a case the pilot, who once participated an approved course, would not hold an official document by aviation authorities or a licence in his/her hand.

Considering this or a similar situation **it is inevitable that the pilot**, who fulfils all requirements laid down in AMC to FCL.820 (experience, training course, scientific degree), **receives an official acknowledgment by authorities** for the relevant Condition in any form:

- preferably an explicit Test Pilot Licence (Condition x), or at least
- an endorsement of the Flight Test Rating (Condition x) to the pilot licence or the Attachment.

On the one hand the relatively small number of test pilots would justify the establishment of such an official process by authorities. - On the other hand this official acknowledgement would not only meet the needs of the industry, but **mainly the elementary needs and individual rights of the concerned pilots** (EU citizens).

response *Partially accepted*

Comment 1:
The grand-father rule for pilots category 1 and 2 will be based on a conversion

report established by the Authority. This should allow what the comment is asking for existing pilots.
For new entrants, training in an approved organisation will be needed because the basic regulation (Regulation 216/ 2008) requires so: training for pilots must be done in approved organisations (Article 7). Pilots category 1 and 2 receive a rating in accordance to Part-FCL.
The possibility for training for pilots engaged in category 3 and 4 flight test is still possible in non-approved organisations. Pilots engaged in category 3 and 4 flight test are regulated by Part-21.

Comment 2:
See EU Commission Regulation 1178/2011.

comment *18* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

Please check reference to Appendix 1, as Appendix 1 to Part 21 is the "EASA Form 1", which doesn't seem to have any link with this subject.

response *Accepted*

Editorial has been corrected.

comment *32* comment by: *QinetiQ*

1. Para. 9] QinetiQ strongly agrees with the requirement to train Test Pilots who will undertake flight test at either Category 1 or Category 2. However NPA 17b and NPA 20 both define the likely training required in inadequate terms. In the NPAs, both training courses are defined by duration, ground training, flying hours and aircraft types. QinetiQ's view is that this level of definition is inadequate because, most importantly, the desired level of competence required on successful completion of the course is not stated. A statement of competency should be followed by a definition of the approved means of evaluating this competency - whether it be an ongoing assessment throughout the course or written exam or an airborne test or a combination of all three.

2. [Para. 9] If a minimum amount of ground training continues to be specified then a definition of ground training must be provided, e.g. is pre- and post-flight briefing included?

3. [Para. 9] In addition, if course content is to be defined, then individual subject matter must be specified in the form of a structured syllabus.

4. [Para. 9] The definition of Flight Test Engineer (FTE) training is more problematical due to the lack of definition of exactly what the authorities regard as an FTE. Across the EASA states, FTEs are employed on a vast array of projects and occupy positions that require a wide spectrum of responsibility and competence. The FTE taking data in the back of a glider requires very different competencies from the FTE who is flight test director of a large, multi-national project. The level of responsibility is also markedly different. In choosing to form the training of FTEs into the same categories as Test Pilots, the authority have ignored the fact that the level of competence and responsibility for an FTE engaged in a category 2 work may be very similar to that of an FTE engaged in category 4 work. QinetiQ's view is that the opportunity to define FTE

work by category independent of those categories specified for test pilots has been missed.

5. [Para. 9] The Authority appears to have decided not to recommend mandated training at an approved training organisation for any level of FTE training in any flight test category. Was this the intention?

6. [Para. 9] Appropriate training and associated competencies (whether in-house or at an approved training organisation) for the full range of FTEs, (flight test programme directors, flight trial managers, flight test operators in individual test flights and flight test observers) should be defined in the same manner as described in Para. 1 above.

7. [Para. 9] The dissemination of information from the Authority has been complicated by the appearance of several, inter-linked NPAs at different times. Each NPA has had a separate deadline which has effectively prevented an interested party from commenting on the whole thrust towards harmonization. Whilst in favour of the publication of each NPA as it is ready, a common timescale for all comments pertaining to EASA flight test regulations should adopted.

8. Failure to complete the measures above risks a random diversity of training standards and practices that will lead to a lack of commonality in the flight test environment but also generating confusion and failing to harmonize the flight test regulations, the fundamental aim of the original work.

response *Noted*

Comment 1, 2 and 3: Appropriate syllabi have been defined in Part-FCL (Pilots category 1 and 2) and in Part-21 (lead FTE category 1 and 2).

Comment 4: Please see reply to comment 322.

Comment 5: As the possibility to issue a license to FTE is not envisaged yet (FCL covers only pilots), there is no need to mandate to have such training in an approved organisation. Of course the situation would change if the process outlined in the response to comment 127 would lead to a licensing scheme for lead FTE.

Comment 6: Please see response to comment 1.

Comment 7: Please see response to comment 200.

Comment 8: The Agency considers that with the changed text outlined above, the objective of harmonised standards in Europe has been achieved.

comment *38* comment by: *Austro Control*

The new ELA concept was not taken into consideration in the drafting oft the NPA.

response *Accepted*

The ELA aircraft have now been excluded from the scope of the changed text.

comment	*39* comment by: *Austro Control* The reference to the new Part P to Part 21 EC No. 287/2008 of 28.3.2008 is wrong. (EC) No. 375/2007 of 30. March 2007 would be correct
response	*Accepted* The commentator is correct.

comment	*79* comment by: *Walter Gessky* **Item 9**: The new ELA concept was not taken into consideration in the drafting of the NPA.
response	*Accepted* The ELA aircraft have now been excluded from the scope of the changed text.

comment	*80* comment by: *Walter Gessky* **Item 9:** The reference to the new Part P to Part 21 (EC) No. 287/2008 of 28.3.2008 seems to be not correct. I used (EC) No. 375/2007 of 30. March 2007 as reference with regard to the new Part P, issuance of Permit to Fly.
response	*Accepted* The commentator is correct.

comment	*100* comment by: *Wolfgang Schwefel* IV.8. In principle the NPA and the harmonisation effort of flight test crew qualifications is supported and it is agreed to proceed with this NPA. IV.8. Additionally, it is to be mentioned that it must be possible for flight test pilots engaged in CAT 1 and CAT 2 flight testing to receive special authorization for type and class rating from the authority as currently referenced in JAR-FCL 1.230 without a type or class rating training at an e.g. FTO or TRTO to conduct the appropriate flight tests under a Permit to Fly legally. This procedure has been used successfully and legally for LBA TB-1 and TB-2 flight test pilots in Germany since the establishment of JAR-FCL. These special authorization are limited to projects. This procedure must be retained. IV.9. It is supported to link the pilot´s qualification to her/his licence in case of pilots engaged in CAT 1 and CAT 2 flight testing but it must be assured that no additional burden is given to the existing flight test crews. The training of the test crews was very expensive and additional costs cannot be affored by the people and small DOAs. When linking the pilot´s qualification to her/his licence in case of pilots engaged in CAT 1 and CAT 2 flight testing, then it will become a legal basis. This is important for the aircraft and flight crew third party insurances. IV.9. The suggestions as listed regarding the qualifications for flight crews engaged in CAT 3 and CAT 4 flight tests are supported.

response

Noted

First comment: The Agency thanks the commentator for his support.

Second comment: This possibility has been introduced in FCL.725 (e)

Third comment: Grand-father rules have been drafted.

Fourth comment: The Agency thanks the commentator for his support.

comment

104 comment by: *MT-Propeller Entwicklung GmbH - DOA EASA 21J.020*

IV.8. In principle the NPA and the harmonisation effort of flight test crew qualifications is supported and it is agreed to proceed with this NPA.

IV.8. It is to be mentioned that it must be possible for flight test pilots engaged in CAT 1 and CAT 2 flight testing to receive special authorization for type and class rating from the authority as currently referenced in JAR-FCL 1.230 without a type or class rating training at an e.g. FTO or TRTO to conduct the appropriate flight tests under a Permit to Fly legally. This procedure has been used successfully and legally for LBA TB-1 and TB-2 flight test pilots in Germany since the establishment of JAR-FCL. These special authorization are limited to projects. This procedure must be retained.

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IV.9. The suggestions as listed regarding the qualifications for flight crews engaged in CAT 3 and CAT 4 flight tests are supported.

response

Noted

First comment: The Agency thanks the commentator for his support.

Second comment: This possibility has been introduced in FCL.725 (e).

Third comment: Grand-father rules have been drafted.

Fourth comment: The Agency thanks the commentator for his support.

comment

107 comment by: *Luftfahrt-Bundesamt*

Item 9:
- It is not sure that flight tests will usually be performed under a permit to fly. As an example: For validation of STCs some testing requested by the Validating Authority may take place on a series airplane with a standard airworthiness certificate.

- According to information available to us, the referenced Commission Regulation No 287/2008 is not the one introducing Subpart P to Part-21 on the

subject of a permit to fly. The correct reference would be No 375/2007.

- Creation of an Appendix 1 to 21A.708 (or, in other references within this NPA, appendix XII to Part 21): See comments under Draft Opinion, below.

response

Noted

First comment: An aircraft with a non-approved STC can only fly under permit to fly in accordance to Part -21. Flight test is performed under a permit to fly regardless if the aircraft has or not has the C of A.

Second comment: The commentator is correct.

Third comment: This will be replied under the comment for the draft opinion.

comment

157 comment by: *Italian Air Force Test Center*

Explanatory note IV (8.) Content of the draft opinion/decision
On the second bullet, it is clearly stated that *"it is important to note that the intent was not to create flight test licence"*. The reason for this decision is not clear. In fact, having the possibility to release a flight test licence could solve several problems of qualifications in terms of type/class rating and in terms of clearly define the limits and boundaries of the flight test personnel involved in the four testing Categories reported in the document.

response

Noted

The reason not to propose a specific licensing scheme for pilots was that the vast majority of EU Countries does not have such a regime for flight test pilots. For FTE, FCL is only applicable to pilots. However, such licences could be issued depending of the outcome of the process outlined in the reply to comment 127. The Agency has defined in Part-21 and Part-FCL an acceptable minimum standard for safety until the A-NPA outcome.

comment

192 comment by: *GAMSTAT*

§ 8:
Firstly, it is reported that the intent was not to create flight test licences. French situation is very different from this position because in French DGAC flight test licences exist. Army aviation is fully satisfied with this situation and requests to maintain French existing rules.

§ 9:

Concerning test pilot, we request two different types of relevant requirements, one for pilots engaged on flight 1 and 2, one for pilots engaged on fight test 3 and 4.

In the first case, pilot has to complete a training course at an approved training organisation appropriate to intended aircraft and category of flight (1 to 4). In the second case, pilot has to complete a training course at an approved training organisation appropriate to intended aircraft and category of flight (3 and 4) as well.

These two kinds of training courses still exist.

The result is that in case of pilots conducting flight tests of categories 3 and 4, the qualification will be linked to the flight test pilot licence. This modification is mandatory to keep flight safety at the same level.

"Relevant requirements for the pilot" e.g. NPA 2008-17b:
The basis is for the test pilot to hold at least a CPL in the appropriate aircraft category. This assertion is impossible to manage because:
- What will happen for first flights of a new category of aeroplane or helicopter?
- In some cases, category doesn't exist (case of Tiger helicopter).
- Economically, it's impossible to hold CPL in all aircraft categories used by army.

Consequently, we request to maintain flight test licence which allows the holder to fly on all intended aircraft categories and types, subject to demonstrate a minimum of 10 hours of testing flight by 6 month. In that case, obtaining a type rating for test pilot is not necessary to perform flight test.

Regarding flight test engineers, French Army Aviation has the same point of view, which is that the regime applicable to flight test engineers must be similar to the one applicable to flight test pilots. This change is motivated by flight safety in order to conduct flight testing with qualified crews.

response *Noted*

The Agency does not plan to create flight test licences for test pilots because such licences do not exist in the majority of EU countries. Our objective is to define minimum standards to ensure safety. Ratings are envisaged for Pilots category 1 and 2 but not for pilots engaged in category 3 and 4 of flight test.
Relative to flight test engineers licence, please see the response to comment 127.
Category means here aeroplane or helicopter. The purpose of requiring a CPL is to have a basic appropriate licence. We don't require a type rating.

comment *201* comment by: *NAA-PL*

General remarks regarding NPA 2008 - 20

Subjected NPA is proposing mainly harmonization in the group of organizations DOA and POA dealing to aircraft designed according to requirements of CS-25, CS-27, CS-29 and partly to aircraft designed according to requirements of CS-23. Such aircraft are designed and produced mainly by organizations existing several years, in which experience is transmitted in natural manner from generation to generation. Considered NPA only will bring in some positive harmonization.

It looks much more weak in the group of organizations dealing to aircraft more light (remaining part of aircraft designed according to requirements of CS-23 and aircraft designed according to requirements of CS-22, CS-VLA i CS-VLR and others). Many of them have not such a traditions and have not experienced personnel. This mainly applies to organizations which have not yet DOA approval.

In Poland already exist and are observed requirements for flight test personnel, which covers that area as well. Implementing of regulations proposed in NPA 2008 – 20 will be in our case implementing of regulations more liberal and

	moving responsibility on Aviation Authority dealing certification and making opinions for issuing of Permit to Fly. Similar situation is dealing to flight test engineers for test flight category 1 or 2 for all categories of aircraft. It seems to us, that NPA 2008 – 20 should in more detail manner determine principles of performing flight tests also in that second group of aircraft, considering that this group demonstrate high dynamic of growing up and in result the area of danger will be also increasing.
response	*Noted* Please see reply to comment 291.

comment	*301* comment by: *EADS MAS Flight Test* 1.1. It is fully agreed, that it is not necessary to create a specific flight test licence (as explained in Para. IV. 8.)
response	*Noted* The Agency thanks the commentator for his support.

comment	*302* comment by: *EADS MAS Flight Test* 1.2. The qualification for pilots trained for and engaged in Category 1 or 2 flight testing should be linked to their licence as a "rating" or "other rating" giving them the necessary privileges (see 2. and 3.) to do their job (i.e. Test Pilot Cat. 1 or Test pilot cat. 2).
response	*Noted* See EU Commission Regulation 1178/2011.

A. Explanatory Note - IV. Content of the draft decision - para 10 - 14 p. 5-6

comment	*46* comment by: *Diamond Aircraft Ind. GmbH* IS: "...have been introduced in the Subpart **I** of Part 21." SHOULD BE: "... Subpart **P** of Part 21" because Subpart I deals with Noise.
response	*Noted* The commentator is correct.

comment	*47* comment by: *Diamond Aircraft Ind. GmbH* End of 12. IS "...flight conditions introduced by the new Subpart **I** to Part-21" SHOULD BE "...the new Subpart **P** to Part-21" because Subpart I deals with noise.
response	*Noted* The commentator is correct.

comment	*101* comment by: *Wolfgang Schwefel* IV.14. Additionally, it is to be mentioned that it must be possible for flight test pilots engaged in CAT 1 and CAT 2 flight testing to receive special authorization for type and class rating from the authority as currently referenced in JAR-FCL 1.230 without a type or class rating training at an e.g. FTO or TRTO to conduct the appropriate flight tests under a Permit to Fly legally. This procedure has been used successfully and legally for LBA TB-1 and TB-2 flight test pilots in Germany since the establishment of JAR-FCL. These special authorization are limited to projects. This procedure must be retained.
response	*Accepted* See EU Commission Regulation 1178/2011.

comment	*105* comment by: *MT-Propeller Entwicklung GmbH - DOA EASA 21J.020* IV.14. It is to be mentioned that it must be possible for flight test pilots engaged in CAT 1 and CAT 2 flight testing to receive special authorization for type and class rating from the authority as currently referenced in JAR-FCL 1.230 without a type or class rating training at an e.g. FTO or TRTO to conduct the appropriate flight tests under a Permit to Fly legally. This procedure has been used successfully and legally for LBA TB-1 and TB-2 flight test pilots in Germany since the establishment of JAR-FCL. These special authorization are limited to projects. This procedure must be retained.
response	*Accepted* See EU Commission Regulation 1178/2011.

comment	*108* comment by: *Luftfahrt-Bundesamt* Items 11 and 12: For flight conditions resp. permit to fly, Part-21 Subpart P refers, rather than Subpart I.
response	*Noted* The commentator is correct.

comment	*193* comment by: *GAMSTAT* § 14: The table has to be modified within previous remarks on flight test pilots and engineers. We don’t agree with category 4 special mention developed in the paragraph below the table. It is the opposite, this kind of flight requires special qualifications for the crew: understanding of qualification process, acknowledge of qualification process and JAR / FAR requirements, training course
response	*Noted* Comment is not fully understood. Concerning category 4, the requirements envisaged by the Agency are: The test pilot and flight test engineer must have been appointed by the

organisation performing the flight test.

The intention is to ensure that the selection process is performed and documented in the Flight Test Operations Manual.

Sufficient experience for the pilot would be defined by at least 1 000 hours as PI/C on the same class of aircraft.

comment

196 comment by: *GAMSTAT*

§ 22.c:
"Flight testing for other purposes (e.g. research) will not be affected by this NPA": what's about flight testing for research? Will there be a further NPA for flight testing for research?

response

Noted

Aircraft specifically designed or modified for research purposes are Annex II aircraft and therefore regulated not by EASA but by the Member States.

comment

197 comment by: *Federal Department of Defence,Civil Protection and Sport DDPS, armasuisse, Flight Test*

Simplified requirements to obtain a type rating when a flight test pilot participated in the development of the type rating syllabus for an aircraft shall be provided. EASA's rule-making could be in line with the process already in effect for new design aircraft within the US through the Letter of Authorization process for an experimental aircraft prior to issuance of a Type Certificate.

response

Partially accepted

This has been introduced in paragraph FCL.725 (e). See EU Commission Regulation 1178/2011.

A. Explanatory Note - IV. Content of the draft decision - para 15 - 18 p. 6-8

comment

12 comment by: *Pilatus*

A.1 Introduction
Pilatus Aircraft Ltd. have reviewed EASA Notice of Proposed Amendment (NPA) No. 2008-17b and NPA No. 2008-20 and recognises the value in attempting to establish guidelines for flight test operations and to standardise the qualifications and experience of flight test crews. Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process very similar to that proposed by the NPA. However, Pilatus considers that the proposed regulation does not give sufficient credit for taking a balanced approach to the qualifications and experience of flight test crews operating in an existing safe and proven environment. Namely, to use highly qualified and experienced supervisors to monitor the activities of personnel with considerable type and role experience. It is the assertion of this company that the proposed amendments will not, in all cases, have the effect of improving standards of practice in flight test, but indeed could have the opposite effect as outlined below. In addition this proposal may have a significant adverse effect on the proven and successful flight test activities currently conducted.

A.2 Categories of Flight Test

Categorising flight test into 4 broad categories is something that most personnel engaged in this vocation would agree upon, but difficulties emerge when attempting to place every type of flight test conducted at Pilatus Aircraft Ltd. into one or other of these categories. For example, specialised avionics test flights, which require pilots with appropriate military or civil experience, would in future need to be carried out by test crews with new qualifications but who may lack the appropriate role experience. That is why Pilatus Aircraft Ltd. believes that it is more appropriate to follow a balanced, supervisory approach where experience in the role and on type provides a more efficient and safe solution.

A.3 Categories of Aircraft/Engine Type

The NPA splits CS-23 aircraft into categories, to permit a structured approach to crew competence levels depending on the complexity of the aircraft to be tested. While this is considered a practical approach, the reason for placing CS-23 jet aircraft in a higher category than CS-23 turboprop aircraft (which can be more complex than turbojets/turbofans both mechanically and in terms of their effects on aircraft handling and performance) is not clear. There is no precedent in current test pilot training schools to suggest that testing of a jet-powered aircraft requires any greater qualification or training than testing of a turbo-prop powered aircraft. This differentiation would seem unreasonable, resulting in unnecessary restrictions for those testing jet-powered aircraft. It is suggested that a better split would be between single- and multi-engine aircraft (of whatever engine type) due to the additional testing required for multi-engine aircraft. This would better fit with paragraph 17 of the NPA, which states: "The competences and experience depend on 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.4 Flight Test Aircrew Training and Experience

This company has a proven track record of producing and certifying high quality aircraft, and has done so employing many individuals without the formal qualifications proposed in this NPA. Mandating such qualifications across the board, however, would prevent many members of the Pilatus flight test team from continuing their work, and will have considerable detrimental effects on the company's ability to conduct a high proportion of future flight tests.

It is considered that attendance of a "specific course" should not be the only acceptable means of satisfying the training and experience requirements for flight test crews. Introduction of the proposed amendment could result in individuals with the required formal qualification but far less experience on type replacing individuals with less qualification but significantly more experience on type. This would not necessarily represent an improvement in standards of flight test and safety, but could indeed represent the opposite.

Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process. The process is continuously audited and strictly supervised by a Head of Flight Test (FTE) with 25 years flight test experience and a Chief Experimental Test Pilot with all the qualifications required by the NPA. Therefore a suitable supervisory system is utilised with individuals of considerable experience and qualifications supervising the flight test process, as well as ongoing training in flight test related skills.

Flight test personnel are selected for a given task based upon their knowledge and suitability for that task. Training is provided as required by experienced Pilatus staff, external consultants or by attending an approved training course as considered appropriate.

It is suggested that alternative training for staff engaged in all types of testing could be accepted as follows:

- Internal training given by experienced staff who have a proven track record in the industry (and who have been approved by the national authority) should be permitted.

- Experience in flight testing of similar aircraft, either within the company or from previous appointments, should be taken into consideration (including in-house training for all types of aeroplanes). It may be necessary to approve these on a case-by-case basis to ensure that the training received is appropriate to the task to be undertaken. This would also apply to any external crew brought in to carry out an assessment, and could be administered using the Permit to Fly procedure.

The test pilot or FTE must be sufficiently experienced to cope with normal and emergency situations. To cover this, flying currency in the same class of aeroplane as that to be tested, should be maintained (including recent experience of manoeuvres similar to those to be tested). Relevant training (including aeromedical, safety equipment, ejection seat and survival training) as appropriate to the aircraft to be tested should be provided and the aircrew member must be physically fit to the level required to fly in the test aeroplane. Guidelines on acceptable levels of training and timescales for currency (both flying currency and aeromedical/survival training) should be drawn up and publicised.

A.5 Specifications for test pilot school courses

Pilatus personnel have undertaken short courses at the various recognised test pilot schools. In some cases these courses do not comply with the seemingly arbitrary requirements set by NPA-17b. In particular the requirement to fly 12 different fixed-wing types during a 15 week course seems quite unreasonable. It is reasonable to suggest that more experience on a far fewer number of aircraft similar to those under test at the test pilots company is more appropriate from an efficiency and safety point of view.

The intention of the 10 month course (required for condition 1 experimental flight test in the NPA) at these schools must also be considered. This course is offered with the intention of training government-sponsored test crews to carry out all possible future government test programmes, and as such offers significant training in such subjects as fly-by-wire flight control systems and transonic handling characteristics. Such training would clearly represent an unnecessary waste of time and money for a commercial organisation such as Pilatus Aircraft Ltd.

A.6 Conclusion

Pilatus Aircraft Ltd. flight test personnel will, at one stage or other, be involved in every type of flight test as defined in the proposed amendment. This

company takes a responsible and balanced approach to its flight test personnel, as it would be prohibitively expensive to employ exclusively graduate test pilots and graduate flight test engineers from the 5 recognised schools. Pilatus believes that a balanced approach to crew experience, combined with on-the-job training, and appropriate specialised training, and defined and proven practice and process would meet the intent of the NPA and enhance flight safety with an acceptable level of investment without significant financial burden on the industry. Therefore Pilatus can not agree to the content of this NPA and specifically opposes the requirements set forth in A.3, A.4 and A.5.

response

Not accepted

A.1 Introduction:
The Agency has reviewed the comments with a review group where Industry and Flight Test Training Schools were represented. We believe that the changed text represents a minimum standard for safety. **As this standard covers a significant breadth and depth of knowledge, it will help crews moving to one aircraft to another or to approach new technologies**. A grand-father clause has been introduced to allow existing flight test crews to continue doing their job. Monitoring the flight test activities will be done using the flight test operations manual.

A.2 Categories of Flight Test:
The 4 categories are covering the vast majority of flight tests to be performed. We expect that the flight test operations manual would provide the necessary complements to cover the kind of specific flights described here.

A.3 Categories of Aircraft/Engine Type:
Agreed, the criteria of propulsion has been replaced by a criteria of performance (Speed and altitude). In that context, we felt that there was no need to further distinguish between single and twin engine aeroplanes.

A.4 Flight Test Aircrew Training and Experience:
Please see response to A1.

A.5 Specifications for test pilot school courses:
We have now established detailed syllabus in cooperation with the schools and Industry.

A.6 Conclusion:
Please see reply to A1.

comment

17 comment by: *Bernhard Zinser*

to 16.

Approved training courses or training organizations might loose approval in the long term. In such a case the pilot, who once participated an approved course, would not hold an official document by aviation authorities or a licence in his/her hand.

Considering this or a similar situation **it is inevitable that the pilot**, who fulfils all requirements laid down in AMC to FCL.820 (experience, training course, scientific degree), **receives an official acknowledgment by authorities** for the relevant Condition in any form:

- preferably an explicit Test Pilot Licence (Condition x), or at least
- an endorsement of the Flight Test Rating (Condition x) to the pilot licence or the Attachment.

On the one hand the relatively small number of test pilots would justify the establishment of such an official process by authorities. - On the other hand this official acknowledgement would not only meet the needs of the industry, but **mainly the elementary needs and individual rights of the concerned pilots** (EU citizens).

response *Partially accepted*

See EU Commission Regulation 1178/2011.

comment *19* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

As category 4 Flight Tests can be used by DOAs (see 24.2.b.ii), and considering organisations other than the manufacturers can hold a DOA, the term "manufacturer" seems inappropriate here.

response *Noted*

The commentator is correct.

comment *40* comment by: *Austro Control*

When the manufacturer propose the competence and experience that is considered appropriate for the envisaged flight he is entitled to approve the flight conditions (when the POA hold the adequate privilege), when the approval of flight conditions is not related to the safety of design. Only in cases related to the safety of the design the Agency or a DOA holding an adequate privilege, has to approve the flight conditions.
Wording not in line with (EC) 375/2008.

response *Accepted*

Combining this comment and the comment 82, the correct answer is either through the flight conditions by the agency or through the flight test operation manual for DOA, POA and APDOA.

comment *81* comment by: *Walter Gessky*

Item 16:
It should not be mandated that CS-23 ELA (European Light Aircraft) category aircraft Flight Test Pilots are required to hold a Part-FCL flight test rating, but the minimum standards for flight tests on ELA products should be better regulated.

response *Partially accepted*

FCL ratings will not apply for ELA aircraft (text was changed to reflect this).
The same applicability has been chosen for Part-21 based on the fact that conditions for the crew will be approved either through approving the flight conditions by the Agency or through the flight test operation manual for DOA, POA and APDOA.

This was done to reflect that there were very different situations between member states and that courses truly adapted for this kind of aircraft do not exist today.
This will allow to gain experience and the Agency will introduce a new rulemaking task when sufficient experience is achieved to further regulate the qualifications for ELA.

comment

82 comment by: *Walter Gessky*

Item 17:
"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."
Comment:
When the manufacturer is entitled to approve the flight conditions (when the POA hold the adequate privilege) he will propose the competence and experience that is considered appropriate for the envisaged flight, when the approval of flight conditions is not related to the safety of design. The adequate procedures has to be approved by the NAA of the MS. Only in cases related to the safety of the design the Agency or a DOA holding an adequate privilege, has to approve the flight conditions.
Wording not in line with (EC) 375/2008.
Minimum standards for flight test pilots of ELA products has to be established and added to the rule.

response

Accepted

Combining this comment and the comment 82, the correct answer is either through the flight conditions by the agency or through the flight test operation manual for DOA, POA and APDOA.

comment

120 comment by: *ECA- European Cockpit Association*

Porpose to add the following words in the last sentence Point 16 of the explanatory note:
This competence and experience will be ***analysed*** and approved ***when appropriate*** by the Agency as part of the approval of the flight conditions.

ECA recognises the need to let small organizations continue with their own manufacturing business. That is why we do agree on the differentiation of small aircraft builders from the big ones. On the other hand, for flight test category 1 and 2 the requirements should not be different.
The fact that the Agency takes the final responsibility for the approval of the requirements for pilots engaged in flight testing is a good development.
The Agency would be accountable for the approval of the requirements. That is why ECA thinks it is necessary to clarify that the Agency may not approve the proposal from the manufacturer, if the analysis shows lack of pilot's experience or training.

response

Accepted

The Agency agrees with the interpretation.

comment	*194* comment by: *GAMSTAT* § 16: In the first paragraph, the case of flight test engineers performing category of flight 1 or 2, has to be added: engineers have to complete a training course at an approved training organisation appropriate to intended category of flight (1 and 2). The second paragraph has to be modified within previous remarks on flight test pilots performing category of flight 3 and 4. § 17: This entire paragraph must be deleted and replaced by: Categories 3 and 4 are demanding specific techniques of flight and acknowledge. As a consequence, pilots have to complete a training course at an approved training organisation appropriate to intended aircraft and category of flight (3 and 4). In a same way, engineers have to complete a training course at an approved training organisation appropriate to intended category of flight (3 and 4).
response	*Not accepted* Test pilots are covered by FCL. Only pilots performing category 1 or 2 test flights need to have a rating. In that case, training must be done in an approved organisation. The reason to require a rating was that it reflects a competence that is specific to the person. On the contrary qualifications for category 3 and 4 of flight tests are related to the organisation. In such case, ratings were not deemed necessary. This also allows doing training in a non-approved organisation and this offer more flexibility. FCL covers only pilots. FTE cannot be regulated by FCL. Training may thus be done in a non-approved organisation. However, it should be noted that the privileges of flight test training schools can be extended to FTE under certain conditions. Finally, the situation could change depending of the outcome of the process described in the reply to comment 127.

comment	*262* comment by: *Light Aircraft Association UK* Paragraph 16. We are pleased to note that aircraft approved under CS-22, CS-VLA, etc are not to be included in this proposal. We would propose the addition of CS-LSA to this list. We would further propose that aircraft falling into the definitions of ELA1 or ELA2 be excluded from these requirements. This would retain flexibility of operation for the flight testing of light aircraft: NPA 2008-07 expressed the desire to keep the approval process for such aircraft as simple as possible.
response	*Partially accepted*

FCL ratings will not apply for ELA aircraft (text was changed to reflect this).
The same applicability has been chosen for Part-21 based on the fact that conditions for the crew will be approved either through approving the flight conditions by the agency or through the flight test operation manual for DOA, POA and APDOA.
This was done to reflect that there were very different situations between member states and that course truly adapted for this kind of aircraft do not exist today.
This will allow to gain experience and the Agency will introduce a new rulemaking task when sufficient experience is achieved to further regulate the qualifications for ELA.

comment

271 comment by: *European Sailplane Manufacturers*

In para 16 it is stated that for the "small" categories (e.g. CS-22, CS-VLA) the competence and the experience of the flight crew will be approved by the Agency as part of the flight conditions approval.

This is considered by the sailplane manufacturers as a pragmatic and suitable approach to the topic of this NPA and reflects also the already existing praxis.

In certain member states no additional rating / training has been required for flight testing of such aircraft.
This old situation has not lead to safety problems and therefore no additional regulation is needed.

Also no additional manuals in the POA / DOA (including ADOA) should be introduced.
The experience shows that the need for further manuals does indees make those manuals heavier (literally and heavier to get them approved) but takes energy away from development work and the staff in the design offices.

The Agency has already recognised the need for better (= simpler) regulation for General Aviation under the MDM.032 context.
Consequently this NPA should use the definitions of the ELA aircraft (ELA 1 and ELA2).

Therefore the sailplane manufacturers propose to include wording that ELA1 and ELA2 aircraft do not fall under the proposed new rules described in this NPA.

response

Partially accepted

FCL ratings will not apply for ELA aircraft (text was changed to reflect this).
The same applicability has been chosen for Part-21 based on the fact that conditions for the crew will be approved either through approving the flight conditions by the agency or through the flight test operation manual for DOA, POA and APDOA.
This was done to reflect that there were very different situations between member states and that course truly adapted for this kind of aircraft do not exist today.
This will allow to gain experience and the Agency will introduce a new rulemaking task when sufficient experience is achieved to further regulate the qualifications for ELA.

comment	*272* comment by: *European Sailplane Manufacturers* Para 17. regarding the introduction of grandfather rule(s): As no special rating / qualification was required for flight testing of certain categories (e.g. CS-22) in certain member states it should not be considered to include more stringent requirements for the "small" categories of aircraft. Neither should be done for the approval of the regarding organisations. The existing system by control via the flight conditions approval process has proven to be working and has not resulted into systematic or safety problems.
response	*Noted* The comment is not fully understood. As CS-22 and now ELA aircraft have been excluded from the need to obtain test ratings in FCL and to comply with the specific requirements for pilots engaged in category 3 and 4 of flight test and FTE in Part-21, a grand- father rule is not necessary.

comment	*273* comment by: *European Sailplane Manufacturers* para 18. Introduction of another manual for the organisation approvals is opposed by the sailplane manufacturers. Experience shows that the approval process often is not very efficient and the companies are typically that small that the very same engineers designated for design and certification work have then also to write the manuals and have to carry the administrative burden of the according manual approval. It would be much more efficient to let these persons concentrate on conducting safe flight tests (because typically this is also on their task list as design engineer). A real benefit (instead of the requirement of another approved manual) would be to offer good information material. Internationally some work has already been published which describes efficient and safe flight testing for small aircraft. It would be highly appreciated if EASA could offer direct support by a centrally managed data & information pool where such material could be directly accessible to these typically very small organisations. This would offer the chance to really improve safety as not much effort for sampling literature and other information material can spent by such small companies if this has to be done on own ressources.
response	*Noted* The Agency believes that if organisations are conducting flight test they should document it in their procedures. That is the reason why an FTOM has been required. The AMC for FTOM clearly specify that it can be a stand-alone document or included into other documents from the Company. The Agency would be happy to receive the material mentioned in the comment so that it could consider it as further guidance material to complement the AMC for FTOM.

comment	*275* comment by: *EFLEVA* Paragraph 16 EFLEVA welcomes the fact that aircraft approved to CS-22, CS-VLA and CS-VLR are excluded from the scope of the NPA. However EFLEVA would suggest that CS-LSA should be added to the exclusions, as should ELA1 and ELA2 aircraft approved under CS-23.
response	*Partially accepted* FCL ratings will not apply for ELA aircraft (text was changed to reflect this). The same applicability has been chosen for Part-21 based on the fact that conditions for the crew will be approved either through approving the flight conditions by the agency or through the flight test operation manual for DOA, POA and APDOA. This was done to reflect that there were very different situations between member states and that course truly adapted for this kind of aircraft do not exist today. This will allow to gain experience and the Agency will introduce a new rulemaking task when sufficient experience is achieved to further regulate the qualifications for ELA.

A. Explanatory Note - V. Regulatory Impact Assessment - para 19 - 22 p. 8-9

comment	*4* comment by: *Chris Brady* Attachment #2
response	*Noted* Maintenance check flights and customer demonstration flights are not covered by this NPA. Maintenance check flights will be covered by task MDM.097 (RMT.0393/.0394) started already and due to finish in 2014-2015. Having read your explanation about the customer demonstration flight and their link with maintenance, the Agency will consider adding such flights to the task mentioned above. We agree that the procedures and crew qualification to conduct such flights need to be appropriately regulated.

comment	*109* comment by: *Luftfahrt-Bundesamt* Item 22 Purpose and intended effect: As regards who is affected by this NPA, there is no mentioning of flight test personnel employed by the EASA or NAAs. There is no requirement proposed for qualification of Authority personnel (no proposed 21B.xxx). There is a potential for a conflict, if a type certification applicant finds that the EASA or NAA test crew does not meet the qualification specified in his flight test operations manual in accordance with Part 21.
response	*Noted* It is expected that the EASA test team will comply with Part-21 including the grand-father rules.

Furthermore the company will have to address the point in its Flight Test Operations Manual.

comment

167 comment by: *Francis Fagegaltier Services*

Paragraphs 21A.33 (d) and (e) of Part 21, in EU Regulation 1702/2003, allows flight tests to be performed by EASA. In RIA, item 22 c, such agency's flight test experts / crews are not listed as being affected by the new rulemaking. For having an overall view of the subject of flight testing, the EASA should explain if and eventually how this changes to Regulation 1702/2003 apply to its own experts.

response

Noted

It is expected that the EASA test team will comply with Part-21 including the grand-father rules.
Furthermore the company will have to address the point in its Flight Test Operations Manual.

comment

195 comment by: *GAMSTAT*

§ 22.c:

"Flight testing for other purposes (e.g. research) will not be affected by this NPA": what's about flight testing for research? Will there be a further NPA for flight testing for research?

response

Noted

Please see response to comment 196

comment

279 comment by: *Rolls-Royce plc [DGJ]*

Regarding the text "...the activities of any design organisation that uses flight testing as a means of compliance to certification requirements will be affected..." of para 22.c:-
Organisations may "use" [*data gathered from*] flight testing but will not necessarily actually "conduct" the flight testing themselves (this potentially being carried out by some third party Flight Test organisation on their behalf). [see comment 280]
We would appreciate confirmation that these requirements are intended to regulate the safety of flight test operations (ie they should apply to organisations which "conduct" flight testing), and are not intended to affect the "use" of data generated by flight test (which should already be covered as part of a Design organisation's approval).

response

Noted

The Agency confirms that the purpose is to address the cases when the company conducts flight test.

A. Explanatory Note - V. Regulatory Impact Assessment - para 23 p. 9

comment *41* comment by: *Austro Control*

ELA concept with regard to CS-23 aircraft with less than 2000kg is not taken into consideration.

response *Noted*

ELA aircraft have now been excluded from the scope of the changed text.

comment *83* comment by: *Walter Gessky*

Item 23.2 and 24.1:
ELA concept with regard to CS-23 aircraft with less than 2000kg is not taken into consideration in the RIA.

response *Noted*

ELA aircraft have now been excluded from the scope of the changed text.

comment *111* comment by: *Luftfahrt-Bundesamt*

Item 23: Options. The offered choice between "do nothing" and "proceed with the NPA" is not really exploring possible ways to implement the objective. It would be more constructive to outline alternative approaches and then compare advantages and disadvantages. An alternative idea is briefly outlined in this set of comments.

- For the case of CAT 3 tests (i.e., production acceptance tests), there is an inconsistency between the requirement "participate in all flights on at least five aircraft" and the text following, making reference to "5 flights". The former is considered adequate.

- For the case of CAT 4 tests, the requirements for "being appointed" and "having been briefed" would apply to all categories of flight tests and do not constitute a level of qualification or experience. Rather, these two elements would be best placed in the company's flight test operations manual.

response

Noted

Point 1: Agreed in principle, but this was following a great deal of work done in JAA.

Point 2: we have now established a more definitive text for the requirements to perform flight test category 3 and it reads as follows:
The pilot(s) shall comply with the requirements of Part-FCL. In addition, the pilot-in-command shall

= hold a flight test rating;
or
= have:
- participated, for each class or type of aircraft, in all flights that are part of the programme leading to the issuance of the individual certificate of airworthiness of at least five aircraft; and
- at least 1000 hours as of flight experience as pilot-in-

command on aircraft of the same category (e.g. large aeroplane).

The lead flight test engineer shall have:
- gained a significant amount of flight experience relevant to the task; and
- Participated in all flights that are part of the programme leading to the issuance of the individual certificate of airworthiness of at least five aircraft.

The aim is to provide hands-on training. The important point is that the pilot follows all test flights and that this covers the complete package of flights needed for the issue of the certificate of airworthiness.
That request has to be fulfilled for each type for which type by type.
Sufficient experience for the pilot would be defined by at least 1000 hours as P I/C on the same class of aircraft.

Point 3: The requirements for performing flight test category 4 reads now as follows:
The pilot(s) shall hold a valid licence appropriate to the category of aircraft under test, issued in accordance with Part-FCL. The pilot-in-command shall hold a flight test rating or have at least 1000 hours as pilot-in-command on aircraft having similar complexity and characteristics.

Competence and experience for lead flight test engineers are defined in the Flight test Operations Manual.

comment *254* comment by: *Aviation Support GmbH*

It should be considered that there are also existing small organisations developing equipment under STC approval as a DOA or under Alternative Procedures to DOA. We design supplementary equipment for CS-27 and CS-29 helicopters under ADOA Privileges (the expansion to a full DOA won't change the problem).
In the majority of cases these changes are single piece or small series systems.
Will there still be the possibility that the flight test crew will be provided by the EASA as it is handled at the moment (costs included to the flat fee)?
If not, the requirement of an own flight test crew with the stated experience for the whole range of helicopter types that we have in our scope would definitely create an undue burden to our company and also to the operators of such systems.
Rising costs for the approvals of "air work" equipment won't improve the readiness of operators to invest in safety.
There is still missing the comparativeness between the business aviation and the very specialised air work community.

response *Noted*

The possibility to sub-contract flight testing will remain but the company should not expect this should be done by the Authority.

comment *292* comment by: *ATR*

1/ EXPLANATORY NOTE, V. RIA point 23.1.b.
It is indicated that check flights are performed by flight crews in accordance with EU-OPS. Even if check flights are not the subject of this NPA, we want to

	highlight that according to OPS 1.001, check flights are excluded from EU-OPS applicability and should be considered when EASA will propose the operational regulation related to non-commercial flights.
response	*Noted* Maintenance check flights are not covered by this changed text. EU-OPS requires the AOC holder to include in its operations manual the procedures for non-revenue flights including test flight. We interpret test flight as being the maintenance check flights. Maintenance check flights are addressed through regulatory action including but not limited to task MDM.097 (RMT.0393/.0394) started already and due to finish 2014-2015.

A. Explanatory Note - V. Regulatory Impact Assessment - para 24.1 p. 10

comment	*42* comment by: *Austro Control* ELA concept with regard to CS-23 aircraft with less than 2000kg is not taken into consideration. Policy relative to the presence of passengers is questionable and should only be allowed for demonstration flights. Flight test operations manual should regulate that adequately.
response	*Noted* For ELA aircraft, please see reply to comment 81. Policy for passengers will be covered by the FTOM.

comment	*121* comment by: *ECA- European Cockpit Association* Sectors affected, add: "Certification of third countries' products" This NPA would pose legal difficulties for the certification of third countries products. The adoption of this NPA would imply that foreign manufacturers seeking EASA certification would have to employ EASA licensed test pilots. If this regulation is incorporated under the FCL framework, this would not be the case.
response	*Noted* Please see reply to comment 110.

comment	*138* comment by: *Franz Redak* SAD cannot concur with the statement that there are an estimated 50 to 100 DOAs involved in flight testing. Currently there are 244 DOAs and 213 ADOAs listed as approved organisations. The number cleaned of engine manufacturers and aircraft manufacturers would certainly leave more than the specified number. It should not be forgotten that also minor changes approved though EASA as individual approvals by individuals or organisations (21A.92b) may include flight testing. The burden to have a FTOM for them is beyond reason. On the other hand to exclude them from the requirement would put appropriate

approved DOAs and ADOAs in a disadvantage position.

response

Noted

Numbers of DOA and AP-DOA conducting flight test: noted.

Minor changes: FTOM is only required in the context of DOA; APDOA or POA. APDOA or DOA are not needed for minor changes. It is expected in such case that the applicant for the permit to fly will describe in the application for flight conditions the qualifications of the intended crew, the procedures and the limitations.
Putting together the guidance for when a modification is major described in Part- 21 AMC and GM and the definitions of categories of flight, we conclude that minor changes are associated to cat 4 tests.
Indeed the AMC/GM reads as follows: major where
...the extent of new substantiation data necessary to comply with the applicable airworthiness requirements and the degree to which the original substantiation data has to be re-assessed and re-evaluated is considerable...
It is obvious from the definitions of Cat 1 and Cat 2 that they can only be associated with a major modification.

comment

148 comment by: *Giorgio Clementi*

Please note that ITPS (Canada) is still active in flight test training and has been since 2001 in Canada and presented training in Europe in 2006. International standing and recognition as judged by whom? If you ask ITPS's customers and graduates your statement would require correction. I shall be happy to provide documentary evidence in support of this.

response

Accepted

We accept that ITPS has international standing and recognition. However, all flight test training schools will have to comply with the requirements we are developing for such schools to obtain an EASA approval.

comment

187 comment by: *UK CAA*

Commentor: UK CAA
Page: 10
Paragraph: A. V. 24.1 Sectors affected.
Comment:
The explanatory note states that the intent of the proposals was to respond to industry's request to develop and harmonise flight test crew qualifications, so that flight test crews qualified in one country could be recognised in other (European) countries. As a result, these proposals are narrowly tailored to suit these criteria, but they would be applicable to all flight test personnel in other parts of the profession, who would be disproportionately unfavourably affected.

Whereas a manufacturer's flight test crew would only have to be qualified on its range of aircraft type(s), those employed by regulators, such as EASA and the NAAs, work in a completely different environment, and necessarily have to cover a much wider spectrum of flight test related tasks. Thus, under these proposals they would have to repeat the training in a number of aircraft categories, the cost of which would be unreasonable, both in financial terms and in the time necessary to complete the training. As a result, the ability of regulators to recruit, train and develop their own flight test personnel will be

severely impacted by these proposals.

For the above reasons, it is recommended that the proposals need to be reviewed to recognise the complete scope of flight test employment and treat each appropriately.

Justification: Self-explanatory.

response *Noted*

Category means here aeroplane or helicopter. The purpose of requiring a CPL is to have a basic appropriate licence. We don't require a type rating. There will be no requirement for retraining for new aircraft types

comment *198* comment by: *Federal Department of Defence,Civil Protection and Sport DDPS, armasuisse, Flight Test*

NonEuropean Test pilot schools shall be recognized as approved training organizations either by application, based on mutual recognition or another simplified mechanism. The rational behind this is, that some non EU schools (e.g. USAFTPS) may do not want to undertake the effort of applying to EASA. As they train very few European testpilots, this school may deem the effort to be disproportionate or have to adhere from appling based on internal policies. However, this would restrict graduates of those schools of performing civil flight test under EASA rules.

In the some context: Some testpilot school are purely military orientated (e.g. USNTPS, USAFTPS), however, this schools teach during their long courses (10 month to 1 year) the flight test methodologies and techniques which are common for civil and military airframes. Many gradates of this schools have successfully transferred to civil flight test without the need of further training. For this reason, EASA shall accept these courses without the need to adapt the syllabus to specific civil regulations.

response *Noted*

See EU Commission Regulation 1178/2011.

comment *267* comment by: *Light Aircraft Association UK*

These proposals also affect regulators (e.g. NAAs) who undertake test flying as a checking function. The proposals as published would significantly affect their ability to fulfill this role due to the extensive requirements for formal training on each type. An experienced test pilot with appropriate general training and broad experience on the category of aircraft under consideration does not need to have formal training on the individual type to fly the aircraft safely, particularly at the lighter end of aviation.

response *Noted*

Category means here aeroplane or helicopter. The purpose of requiring a CPL is to have a basic appropriate licence. We don't require a type rating. There will be no requirement for retraining for new aircraft types.

A. Explanatory Note - V. Regulatory Impact Assessment - para 24.2a. p. 10-11

comment *67* comment by: *Austro Control*

24.2. (a)(ii): Policy relative to the presence of passengers is questionable and should only be allowed for demonstration flights. Flight test operations manual should regulate that adequately

response *Noted*

Policy for passengers will be covered by the FTOM.

comment *84* comment by: *Walter Gessky*

Item 24.2. (a)(ii):
Policy relative to the presence of passengers is questionable and should only be allowed for demonstration flights. Flight test operations manual should regulate the issue adequately.

response *Noted*

Policy for passengers will be covered by the FTOM.

comment *102* comment by: *Wolfgang Schwefel*

24.2.a. Regarding the safety of flight test activities, it is recommended that flight test pilots must have at least completed a Crew Resource Managment (CRM) training course as it is currently required in JAR-OPS. An appropriate level of competence in knowledge must be maintained by regular CRM training courses.

response *Accepted*

See EU Commission Regulation 1178/2011.

comment *149* comment by: *Giorgio Clementi*

The more relevant question to ask in support of the licensing of test pilots would be how many of the test pilots involved in those accidents were graduates of a "recognized" test pilot course and how many had not had formal training? If it proved to be the case that overwhelmingly the accidents were caused by untrained individuals, that would support the case for this proposed regulation. The answer to that question would be readily available within the small flight test community.

In my opinion the military schools' core product the Graduate course, is too expensive and not entirely appropriate for the needs of civil industry. With the exception of EPNER and the Brazilian Test Pilot School none of the military schools have truly any depth of experience in civil aircraft certification and their curricula are focused on the requirements of the fast jet community. This proposed regulation risks enshrining in law a dependence by civil industry on the military producing sufficient numbers of test pilots. Most civil aircraft manufacturers cannot possibly afford the traditional course and can only hope to employ retiring military test pilots.

Having recently spent a considerable amount of time recruiting flight testers for

a start-up flight test department and consulting for another, I can attest to the fact that there are not many ex-military test pilots or FTEs to be found. Incidentally, given the shortage of suitably qualified flight testers, it would be appropriate to also see the Brazilian Test Pilot School, the Indian Air Force Test Pilot School as well as graduates of the Finnish Air Force Flight Test Course mentioned as training providers. There are others, but I have had personal experience/interaction with graduates of the above. We would not want to appear to be too parochial.....

I have interviewed a number of highly experienced civil pilots, many of them with aeronautical engineering degrees who could have been qualified as test pilots. Indeed I did that many times in the past for the DLR as well as Fairchild-Dornier under the old LBA TB-1 and TB-2 rules. This need not cost over a million Euro or however much a military TPS course costs now. An affordable avenue to become fully fledged Class 1 and 2 Test Pilots will no longer exist for such individuals if the proposed regulation is adopted as it presently stands. I would respectfully remind you that it is the intent to provide a civil regulatory solution to a civil industry issue and presenting a military course as the solution does not strike me as appropriate.

Earlier this year whilst contracting at GROB, the Chief Test Pilot, one other test pilot, the LBA designated test pilot and LBA Flight test engineer were all graduates of courses on which I taught or presented, with the sole exception of the CTP all were former civil pilots/engineers. I am very willing to contribute my experience of providing flight test training in civil industry for the past fifteen years.

response *Partially accepted*

The review of the accidents provides a better support to the requirement to have an FTOM rather than to the training and qualification requirements.
We have developed syllabi in consultation with Industry and the Schools and these syllabi are now adapted to the civil needs.
Finally, any (existing or to be started) school can get an approval provided they comply with the requirements that we have developed for such flight test training schools.

comment *188* comment by: *UK CAA*

Commentor: UK CAA
Page: 10
Paragraph: A. V. 24.2 All impacts identified: Paragraph (a) Safety

Comment:
The NPA recognises that there is little justification from the accident record to justify these proposals. Of the 30 fixed-wing accidents cited, only 3 could possibly be related to training or experience matters. Of the 15 rotary-wing accidents, none could be ascribed to test crew qualifications or training.

Given the cost implications of these proposals, it is recommended that the regulatory impact assessment is reviewed with particular regard to the balance between the anticipated safety benefits versus the considerable costs involved.

Justification: Self-explanatory.

response *Noted*

The Agency does not plan to redo formally the regulatory impact assessment because the proposals included in the NPA have been discussed and modified in a review group with Industry and the schools. This has led to a more balanced minimum safety standards.

comment *209* comment by: *SPANAIR*

B. SAFETY IMPACT

During check flights and acceptance flights (performed after maintenance) there is a certain amount of hazard or risk "unpredictability".

Most of the Manufacturers' Test Protocols for such in-flight tests include manoeuvres related to:

- Low Speed Tests up to Stall Warning
- High Speed up to overspeed Warning
- Actual EGPWS tests close to the ground
- Engine shutdowns and relights in the certified envelope
- Depressurization at maximum certified altitudes

response *Noted*

Maintenance check flights are not covered by this changed text.

Maintenance check flights are addressed through regulatory action including but not limited to MDM.097 (RMT.0393/.0394), started already and due to finish 2014-2015.

comment *245* comment by: *Air France - Maintenance Quality Assurance*

As Air France's DOA is part of an airline with terms of approval limited to STC and repairs, from this standpoint Air France have some comments and need some clarification. Our rationale is that design changes classified to be approved by STC do not need an assessment of the general behaviour of the aircraft and/or an impact on crew procedures related with the safe continuation of flight and landing. Therefore STC development and showing of compliance involve category 4 of flight test, excluding categories 1 to 3 which are related to whole aircraft type certification and production.

response *Partially accepted*

We don't agree that all STC will be category 4 flight test. Some of course will be. We have developed AMC material to better define the boundary between category 2 and category 4.

A. Explanatory Note - V. Regulatory Impact Assessment - para 24.2b. p. 12-14

comment *2* comment by: *TAP Maintenance & Engineering*

- The installation of an EGPWS or TCAS system falls into category 2. And an up-grade of TCAS or EGPWS, into what category will it fall?
- What is cabin aircraft pictorial system installation?

response

Noted

We have developed AMC material to better explain the boundary between category 2 and category 4 tests. This AMC has specifically addressed both cases mentioned in the comment. For more details please review the changed text.

comment

3 comment by: *TAP Maintenance & Engineering*

- What is meant by flight test engineer? A part 66 tecnician or a person with an engineering degree?
- What will be the training course approved by the Agency for flight test engineers?

response

Noted

The Flight test Engineers subject to these rules have been defined and syllabi have been agreed. (see answer to comment 322)

comment

11 comment by: *Aerodata AG*

24.2.b.ii

Even though we feel that the Agency has a valid point in considering the installation flight testing for systems such as EGPWS or TCAS as non-standard flight operations, the general judgement that the skills needed (pilots and test engineer) to perform such installation tests for STC work is seen as not being practicable.
For both sample systems the way the flight test is structured and the environment (airspace and location) should play a role with regard to the required pilot skills and the risk involved in performing such testing.

For example TCAS testing: If conducted in coordination with local ATC and with the aid of a test transmitter for target simulation, it is not seen why this test can only be carried out by Category 2 aircrews.

For EGPWS installation the same is true if the selected test range and the test procedures can be shown to allow for safe operation of the aircraft. (example test: using the Brocken of the Harz mountains as test range und VMC).

This holds especially true for slower type CS-23, 27 and 29 aircraft.

We therefore propose that the classification of such tests should be the result of the hazard assessment of the responsible DO rather than a general classification rule. If it can be shown to the Agency that the tests can be performed in a safe environment (especially concerning TCAS installations, where no extraordinary aircraft manoevring is required) it is sufficient to use category 4 aircrews. This hazard assessment shall be provided to the Agency together with the application for Flight conditions, if the DO does not hold the priviledge to issue the Flight Conditions themselves.

response

Noted

We have developed AMC material to better explain the boundary between category 2 and category 4 tests. This AMC has specifically addressed TAWS. For more details please review the changed text.

comment *12* ❖ comment by: *Pilatus*

A.1 Introduction

Pilatus Aircraft Ltd. have reviewed EASA Notice of Proposed Amendment (NPA) No. 2008-17b and NPA No. 2008-20 and recognises the value in attempting to establish guidelines for flight test operations and to standardise the qualifications and experience of flight test crews. Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process very similar to that proposed by the NPA. However, Pilatus considers that the proposed regulation does not give sufficient credit for taking a balanced approach to the qualifications and experience of flight test crews operating in an existing safe and proven environment. Namely, to use highly qualified and experienced supervisors to monitor the activities of personnel with considerable type and role experience. It is the assertion of this company that the proposed amendments will not, in all cases, have the effect of improving standards of practice in flight test, but indeed could have the opposite effect as outlined below. In addition this proposal may have a significant adverse effect on the proven and successful flight test activities currently conducted.

A.2 Categories of Flight Test

Categorising flight test into 4 broad categories is something that most personnel engaged in this vocation would agree upon, but difficulties emerge when attempting to place every type of flight test conducted at Pilatus Aircraft Ltd. into one or other of these categories. For example, specialised avionics test flights, which require pilots with appropriate military or civil experience, would in future need to be carried out by test crews with new qualifications but who may lack the appropriate role experience. That is why Pilatus Aircraft Ltd. believes that it is more appropriate to follow a balanced, supervisory approach where experience in the role and on type provides a more efficient and safe solution.

A.3 Categories of Aircraft/Engine Type

The NPA splits CS-23 aircraft into categories, to permit a structured approach to crew competence levels depending on the complexity of the aircraft to be tested. While this is considered a practical approach, the reason for placing CS-23 jet aircraft in a higher category than CS-23 turboprop aircraft (which can be more complex than turbojets/turbofans both mechanically and in terms of their effects on aircraft handling and performance) is not clear. There is no precedent in current test pilot training schools to suggest that testing of a jet-powered aircraft requires any greater qualification or training than testing of a turbo-prop powered aircraft. This differentiation would seem unreasonable, resulting in unnecessary restrictions for those testing jet-powered aircraft. It is suggested that a better split would be between single- and multi-engine aircraft (of whatever engine type) due to the additional testing required for multi-engine aircraft. This would better fit with paragraph 17 of the NPA, which states: "The competences and experience depend on 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.4 Flight Test Aircrew Training and Experience

This company has a proven track record of producing and certifying high quality aircraft, and has done so employing many individuals without the formal qualifications proposed in this NPA. Mandating such qualifications across the board, however, would prevent many members of the Pilatus flight test team

from continuing their work, and will have considerable detrimental effects on the company's ability to conduct a high proportion of future flight tests.

It is considered that attendance of a "specific course" should not be the only acceptable means of satisfying the training and experience requirements for flight test crews. Introduction of the proposed amendment could result in individuals with the required formal qualification but far less experience on type replacing individuals with less qualification but significantly more experience on type. This would not necessarily represent an improvement in standards of flight test and safety, but could indeed represent the opposite.

Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process. The process is continuously audited and strictly supervised by a Head of Flight Test (FTE) with 25 years flight test experience and a Chief Experimental Test Pilot with all the qualifications required by the NPA. Therefore a suitable supervisory system is utilised with individuals of considerable experience and qualifications supervising the flight test process, as well as ongoing training in flight test related skills.

Flight test personnel are selected for a given task based upon their knowledge and suitability for that task. Training is provided as required by experienced Pilatus staff, external consultants or by attending an approved training course as considered appropriate.

It is suggested that alternative training for staff engaged in all types of testing could be accepted as follows:

- Internal training given by experienced staff who have a proven track record in the industry (and who have been approved by the national authority) should be permitted.

- Experience in flight testing of similar aircraft, either within the company or from previous appointments, should be taken into consideration (including in-house training for all types of aeroplanes). It may be necessary to approve these on a case-by-case basis to ensure that the training received is appropriate to the task to be undertaken. This would also apply to any external crew brought in to carry out an assessment, and could be administered using the Permit to Fly procedure.

The test pilot or FTE must be sufficiently experienced to cope with normal and emergency situations. To cover this, flying currency in the same class of aeroplane as that to be tested, should be maintained (including recent experience of manoeuvres similar to those to be tested). Relevant training (including aeromedical, safety equipment, ejection seat and survival training) as appropriate to the aircraft to be tested should be provided and the aircrew member must be physically fit to the level required to fly in the test aeroplane. Guidelines on acceptable levels of training and timescales for currency (both flying currency and aeromedical/survival training) should be drawn up and publicised.

A.5 Specifications for test pilot school courses

Pilatus personnel have undertaken short courses at the various recognised test pilot schools. In some cases these courses do not comply with the seemingly arbitrary requirements set by NPA-17b. In particular the requirement to fly 12 different fixed-wing types during a 15 week course seems quite unreasonable. It is reasonable to suggest that more experience on a far fewer number of aircraft similar to those under test at the test pilots company is more appropriate from an efficiency and safety point of view.

The intention of the 10 month course (required for condition 1 experimental flight test in the NPA) at these schools must also be considered. This course is offered with the intention of training government-sponsored test crews to carry out all possible future government test programmes, and as such offers significant training in such subjects as fly-by-wire flight control systems and transonic handling characteristics. Such training would clearly represent an unnecessary waste of time and money for a commercial organisation such as Pilatus Aircraft Ltd.

A.6 Conclusion
Pilatus Aircraft Ltd. flight test personnel will, at one stage or other, be involved in every type of flight test as defined in the proposed amendment. This company takes a responsible and balanced approach to its flight test personnel, as it would be prohibitively expensive to employ exclusively graduate test pilots and graduate flight test engineers from the 5 recognised schools. Pilatus believes that a balanced approach to crew experience, combined with on-the-job training, and appropriate specialised training, and defined and proven practice and process would meet the intent of the NPA and enhance flight safety with an acceptable level of investment without significant financial burden on the industry. Therefore Pilatus can not agree to the content of this NPA and specifically opposes the requirements set forth in A.3, A.4 and A.5.

response

Not accepted

A.1 Introduction: The Agency has reviewed the comments with a review group where Industry and Flight Test Training Schools were represented. We believe that the changed text represents a minimum standard for safety. **As this standard covers a significant breadth and depth of knowledge, it will help crews moving to one aircraft to another or to approach new technologies**. A grand-father clause has been introduced to allow existing flight test crews to continue doing their job. Monitoring the flight test activities will be done using the flight test operations manual.

A.2 Categories of Flight Test:
The 4 categories are covering the vast majority of flight tests to be performed. We expect that the flight test operations manual would provide the necessary complements to cover the kind of specific flights described here.

A.3 Categories of Aircraft/Engine Type:
Agreed, the criteria of propulsion has been replaced by a criteria of performance (Speed and altitude). In that context, we felt that there was no need to further distinguish between single and twin engine aeroplanes.

A.4 Flight Test Aircrew Training and Experience:
Please see response to A1.

A.5 Specifications for test pilot school courses:
We have now established detailed syllabus in cooperation with the schools and Industry.

A.6 Conclusion:
Please see reply to A1.

comment

15 comment by: *Bernhard Zinser*

NPA 2008-17B suggests for Condition 2 a training course, that "... may last 15 weeks and the flying training should amount to 38 hours on 12 types of airplanes". Understanding NPA 2008-17B correctly a participant of such a course is allowed to perform flight test duties according Condition 2 without any further skill test by authorities.
How do authorities insure that the participant received adequate knowledge and skills to perform the relevant flight test duties? How is attendance monitored and how is the course's successful completion watched? Is there any skill test, examination or final test review integrated in the course to guarantee a homogenous and sufficient level of performance in the interest of flight safety? (comparable to the skill test for Experimental Flight Test Rating Class 2 as examination of theoretical knowledge and a practical flight test task evaluated by authorities and a test pilot).

A **final statement of the approved training organization about the successful course's completion could be the basis for EASA for test pilot's licensing or acknowledgement / documentation of the rating**.

Concerning test pilots and their role **for safety in aviation it must the vital interest of EASA**, not only to monitor the training organization, but mainly to control the "output" - namely **to control the level of knowledge and performance** of each single applicant!

response

Not accepted

See EU Commission Regulation 1178/2011.

comment

20 comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

It is not clear why experience on 15/25 different airplanes types should be required in this paragraph.
The experience on the aircraft to be tested should be emphasized, rather than putting requirements on experience on other types of aircraft which may not be of interest for the flight.
Also, why imposing experience on 15/25 different airplanes on organisations which may only deal with one (or a small number of) aircraft type(s).
This requirement could then lead to an unjustified economical burden for some organisations.

response

Partially accepted

The Agency has now defined syllabi in coordination with Industry and the Schools. All the issues mentioned in the comment have been addressed during those discussions. The result is an acceptable minimum standard.
Please check the changed text for more details.

comment

48 comment by: *Diamond Aircraft Ind. GmbH*

24.2. b I.1. "BSC or equivalent university education is usually requested" (for test pilots/engineers)

We do not agree that this education level can be a requirement and that access to a not university graduated person is denied.

We can agree that for different education levels defined credits are given and that higher basic education might reduce further education time and cost, which is usually practiced in EASA education policies.

response *Partially accepted*

The Agency has now defined syllabi in coordination with Industry and the Schools. All the issues mentioned in the comment have been addressed during those discussions. The result is an acceptable minimum standard.
Please check the changed text for more details.

comment *49* comment by: *Diamond Aircraft Ind. GmbH*

24.2 b i. 1. "-For fixed-wing test pilots: duration 10 months, 500 hours of ground training; 110/120 flying hours on 15/25 different airplanes"

We think that the proposed minimum education in regard to time, hours and aircraft types is exaggerated and will produce excessive cost and downtime for test pilots/engineers without the convincing safety need for this huge upgrade in the requirement.

In our opinion a basic training like 15 weeks with the focus to the relevant tasks togehter with mandatory annual refreseher trainings (about 3-5 days) would raise the level of flight test engineers and keep them up-to-date.

The downtime and costs would be affordable and in the regular refresher the recent developments and accidents in flight testing could be explained and analysed.

response *Partially accepted*

The Agency has now defined syllabi in coordination with Industry and the Schools. All the issues mentioned in the comment have been addressed during those discussions. The result is an acceptable minimum standard.
Please read the changed text for more details.

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In our opinion a basic training like 15 weeks (or modules up to that amount) with the focus to the relevant tasks togehter with mandatory annual refreseher trainings (about 3-5 days) would raise the level of flight test engineers/pilots and keep them up-to-date.

The downtime and costs would be affordable and in the regular refresher

the recent developments and accidents in flight testing could be explained and analysed.

In addition to that previous experience/qualification shall be credited for further education or qualification. For example: Cat. 1 test pilot for CS-23 propeller airplanes with the endorsement on jet airplanes should be qualified for test pilot on a CS-23 jet airplane when the jet propulsion module was part of his basic education.

The knowledge and experience of flight test engineers/pilots can very hardly compensate for the failure to ensure that pertinent information in the engineering department was communicated to the test test engineer/pilot.
Furthermore, the flight test engineer/pilot cannot have a deep engineering knowledge in all aspects of aircraft development, meaning that are not entitled to function as supervisors for all engineering decisions.

The example provided by NTSB report LAX95LA067 (Occurrence Date: 30/12/1994 - Harris / BD-10) "The in-flight overload failure of the left vertical stabilizer spars, at force levels substantially below the predicted ultimate failure loads, due to inadequate substantiation by the designer" describes an accident where probably the test pilot had very little possibility to verify the load calculations provided by the designer.

There are further examples of accidents in flight testing where the reason was determined as design-, production-, maintenance- or coordination-deficiency where the best educated pilot could not avoid the accident. So to increase the safety of test flights all these items have to be taken into consideration and deficiencies correted.

response *Partially accepted*

The Agency has now defined syllabi in coordination with Industry and the Schools. All the issues mentioned in the comment have been addressed during those discussions. The result is an acceptable minimum standard.
Please check the changed text for more details.

comment *99* comment by: *Diamond Aircraft Ind. GmbH*

24.2.b.i. IS: "This requirement is limited to CS-25 aircraft, to jet airplanes certified to CS-23, to CS-23 Commuter Category..."

SHOULD BE: "This requirement is limited to CS-25 aircraft, CS-23 aircraft above 2722kg/6000lbs. MTOM, ..."

This "class grouping" should be included in the Part 21 or AMC/GM text.

There is no comment regarding the new classes ELA 1 and 2.

Justification:

Light airplanes have similar behaviour and risk no matter which type of propulsion. Therefore the recommendation is to distinguish between "light" and "heavy" like most of the Part-21 regulations do (see 21A.101 and others).

response *Partially accepted*

ELA aircraft (in particular aeroplanes with a maximum take-off mass below

2 000 kg) have been excluded from the scope of these proposals.

comment

103 comment by: *Wolfgang Schwefel*

24.2.b.i. Qualified flight test pilots with university degrees in aeronautical and/or mechanical engineering should automatically be qualified as Flight Test Engineers for CAT 1, 2, 3 and 4. Appropriate project and flight experience should be available.

24.2.b.iv. The main concerns of existing flight test crews are that their flight qualifications and their experimental flight rating (e.g. LBA TB-1 and TB-2) which were hard to obtain, and very expensive, and must be retained without any cut back on. Therefore the grandfather rules are very interesting but these grandfather rules although been developed according paragraph 24.2.b.iv are not listed in this NPA.

response

Noted

First point: The Agency does not see the need to define such equivalency formally. A test pilot can perform the duties of an FTE: the crew composition is addressed by the FTOM.

The intent of the grand-father rules is that test crew can continue the activities they are doing.

comment

106 comment by: *MT-Propeller Entwicklung GmbH - DOA EASA 21J.020*

24.2.b.i. Qualified flight test pilots with university degrees in aeronautical and/or mechanical engineering should automatically be qualified as Flight Test Engineers for CAT 1, 2, 3 and 4. Appropriate project and flight experience should be available.

24.2.b.iv. The main concerns of existing flight test crews are that their flight qualifications and their experimental flight rating (e.g. LBA TB-1 and TB-2) which were hard to obtain, and very expensive, and must be retained without any cut back on. Therefore the grandfather rules are very interesting but these grandfather rules although been developed according paragraph 24.2.b.iv are not listed in this NPA.

response

Noted

First point: The Agency does not see the need to define such equivalency formally. A test pilot can perform the duties of an FTE: the crew composition is addressed by the FTOM.

The intent of the grand-father rules is that test crew can continue the activities they are doing.

comment

129 comment by: *Franz Redak*

24(b)(ii) For distinction to trademarks versus system names EGPWS should be replaced with TAWS in case it is mentioned in the final rule/AMC material.

response

Noted

We have developed AMC material to better explain the boundary between

category 2 and category 4 tests. This AMC has specifically addressed both cases mentioned in the comment. For more details please review the changed text.

comment

142 comment by: *Rob van den Bosch*

This NPA seems to focus primarily large CS-23 and CS-25 aircraft. It does not take into account the needs and financial limitations of small companies that have their business focus on the small part 23 aircraft. E.g. Airline pilots are not generally qualified to perform category 3 or 4 flight test on light single engine aircraft.

response

Partially accepted

ELA aircraft (in particular aeroplanes with a maximum take-off mass below 2 000 kg) have been excluded from the scope of these proposals.

comment

150 comment by: *Giorgio Clementi*

The requirements stated reflect the current traditional "military" one year course, which are excessive, particularly considering the requirements of civil aircraft manufacturers. There is considerable experience of this in the industry. Any flight test school is able within six months to instill the discipline of flight testing, the incremental approach and a sound understanding of performance and stabilty and control flight test methods as well as the fundamentals of avionics systems testing (for civil certification). After a year of working under the supervision of a more senior test pilot (no one steps out of TPS into the CTP role) the result is indistinguishable from the one year course graduate. The difference in cost however is huge. I would suggest that a six month civil course should be an option for Class 1 and 2 flight tests.

It is not clear to me from the NPA, but I would also suggest that there should be a means for pilots to upgrade from one Class of flight tests to another which should be something other than attending the full course. Recognising that with experience and exposure most individuals are capable of taking on increased responsibility and aspire to improvement. This was always possible under the German LBA regulations where individuals holding a TB-2 license could attend an "Uplift Course" which was shorter than the year course.

Far be it from me to advocate against training, but lets not force down industry's throat training it can't afford at a time when the militay worldwide is producing fewer qualified flight test personnel.

response

Partially accepted

The Agency has now defined syllabi in coordination with Industry and the Schools. All the issues mentioned in the comment have been addressed during those discussions. The result is an acceptable minimum standard.
A concept of 'bridge' courses has been agreed and the prior experience of the applicant for the course can be taken into account.
Please read the changed text for more details.

comment

189 comment by: *UK CAA*

Commentor: UK CAA
Page: 12
Paragraph: A. V. 24.2 All impacts identified – Paragraph (b) Economic

considerations

Comment:
The economic impact of requiring specific training to be undertaken separately on CS-23, 23 Commuter, 25, 27 and 29 categories has not been adequately addressed:

- It has the potential to escalate the cost of achieving the same level of qualification and privileges available today without offering a corresponding improvement in safety.
- Limiting pilots to aircraft categories for which they have undergone training (in accordance with FCL.820) will result in increased inflexibility and otherwise well qualified test crews being arbitrarily deemed unsuitable for conducting tests for which today they are considered competent. In the context of the relatively small number of personnel in the flight test community, this inflexibility will be a significant and unwelcome burden.
- Fully instrumented flight test training aircraft are valuable assets and are expensive to operate. The only source of these aircraft would be those owned by the existing flight testing schools. Thus the ability of the training market to respond to the needs of these proposals is strictly limited.
- There does not appear to be any credit in the proposals for the common aspects of test pilot training that are not related to aircraft type, such as the general principles of flight testing. These elements would not need to be covered by pilots already qualified in any one category, and would lessen the costs associated with training in a different category.

Justification: Self-explanatory.

response *Noted*

See EU Commission Regulation 1178/2011.

comment *261* comment by: *Light Aircraft Association UK*

The RIA suggests that a test pilot carrying out category 1 or 2 testing would need to undergo a training course of about 10 months duration, 500 hours of ground training, 110/120 hours flying on 15/25 different aeroplanes. This is obviously aiming at the typical content of the major flight test centres such as ETPS in the UK and EPNER in France which train pilots for flight testing all classes of aircraft including large, complex aircraft.

It is suggested that for test pilots who are only involved in flight testing small CS-23 single-engined non-commuter category aircraft, it would be inappropriate to require flight test training on large and complex aircraft. A much less extensive flight test training course could provide adequate training limited to light aircraft only, and hence contain the costs of the flight testing aspects of the type certification process for a new light aeroplane to an appropriate level. (See also comment against Para IV.16.)

response *Partially accepted*

ELA aircraft (in particular aeroplanes with a maximum take-off mass below 2 000 kg) have been excluded from the scope of these proposals.

comment	*276* comment by: *EFLEVA* EFLEVA consider that the qualification requirements for flight-test crew involved in testing small CS-23 light aircraft such as ELA1 and ELA2 is over prescriptive. There would be little purpose in training pilots to deal with large complex aircraft if this was outside the scope of his requirement. The proposed requirements in the NPA would make flight-testing of small non-complex aircraft very expensive.
response	*Partially accepted* ELA aircraft (in particular aeroplanes with a maximum take-off mass below 2 000 kg) have been excluded from the scope of these proposals.

comment	*287* comment by: *Hélicoptères Guimbal* Please refer to the comment 286 made on Draft opinion subpart P. In addition, the absence of details on accidents prevents ther reader from drawing conclusions, especially for small simple piston engine helicopters, CS/FAR 27 reprensenting a wide range of helicopters that have to be distinguished to allow an accurate analysis. It is highly propable that none of the quoted accidents are relevant for the piston engine helicopter category (last certified before Cabri G2 was more than 10 years ago), all the more dealing with flight category 2, 3 and 4.
response	*Noted* There is not sufficient detail to allow an accurate analysis.

comment	*303* comment by: *EADS MAS Flight Test* 2.1. A pilot trained and rated (acc. 1.2) corresponding to Category 1 (NPA V.24.2.b.*1.*) shall be generally authorized to perform flights based on a permit to fly without specific approval by national authorities or JAA, provided that he/she has been involved in the development process of the specific type of aircraft. This includes maiden flights, opening or expansion of the operating envelope.
response	*Noted* See EU Commission Regulation 1178/2011.

comment	*304* comment by: *EADS MAS Flight Test* 2.2. A pilot trained and rated corresponding to Category 2 shall be authorized to perform flights based on a permit to fly within the cleared operating envelope without specific approval by national authorities or JAA.
response	*Noted* See EU Commission Regulation 1178/2011.

comment	*305* comment by: *EADS MAS Flight Test* 3.1. A pilot trained and rated (acc. 1.2) corresponding to Category 1 (NPA V.24.2.b.*1.*) shall be generally authorized to instruct and evaluate other pilots

	on each type of aircraft he/she holds a type rating for.
response	*Not accepted* You need to be an instructor to provide training for the purpose of obtaining a flight test rating. See EU Commission Regulation 1178/2011.

comment	*306* comment by: *EADS MAS Flight Test* 3.2. A pilot trained and rated (acc. 1.2) corresponding to Category 1 (NPA V.24.2.b.*1.*) shall be generally authorized to instruct and evaluate other test pilots on aircraft operated based on a permit to fly (i.e. new test pilot joins an organisation and shall be introduced into a development program).
response	*Partially accepted* You need to be an instructor to provide training for the purpose of obtaining a flight test rating. Other training provided to a category 1 test pilot not for the purpose of obtaining a test rating need to be covered by the procedures defined in the FTOM. See EU Commission Regulation 1178/2011.

A. Explanatory Note - V. Regulatory Impact Assessment - para 24.2c. p. 14

comment	*21* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc* Why speaking only about "EU manufacturers" ? Are these requirements not applicable to non-manufacturers DOAs/POAs ?
response	*Accepted* The wording proposed by the comment is more accurate.

comment	*50* comment by: *Diamond Aircraft Ind. GmbH* IS: "The flight test requirement of Part-21 applies only to EU manufacturers" SHOULD BE: "...all airplanes flying on EASA PtF in European airspace for flight test purposes" Otherwise there would be still the possibility to delegate flight testing to a non-EU organisation, who could fly in EU airspace according to their rules, without the planned increase of safety to EU citizens.
response	*Noted* The flight test requirements apply to European POA; DOA and APDOA. If a DOA would outsource flight testing to a non-EU organisation, Part-21 would apply as the outsourcing would be done under the DOA quality system.

A. Explanatory Note - V. Regulatory Impact Assessment - para 26 p. 15

comment	*16* comment by: *Bernhard Zinser* concerning "Grandfather Clause":

The Experimental Flight Rating Class 2 (TB2) formerly issued by the German Luftfahrtbundesamt (LBA) included flight tests analogue to Condition 2 as outlined by NPA 2008-17B.

The applicant for an Experimental Flight Rating Class 2 did not necessarily have to fulfil a "training course" as mentioned in NPA 2008-17B. Regulations also offered the option of **theoretical and practical instruction by an active test pilot for at least 12 months** according to a detailed syllabus published under the guidelines **of** the German Ministry of Transportation. Another compulsory requirement was the Aerobatic Rating.
In addition to the above**,** the applicant had to:
(1) pass a theoretical knowledge examination at the authorities (LBA)
(2) demonstrate his skills in a practical flight test task in front of an assigned instructor test pilot (holder of an Experimental Flight Test Rating (Class1)).

Overall, an applicant for an Experimental Flight Rating Class 2 had to demonstrate the **same or even a higher degree of knowledge** than a "training course at an approved training organization" (Condition 2) as proposed by NPA 2008-17B.

Taking into account **qualification of Experimental Flight Rating Class 2 and legal protection of possession / status, Part-FCL regulations** shall be changed **to contain**

- the **continuation** of the Experimental Flight Rating Class 2 or a comparable rating, or at least
- an **acknowledgment / acceptance** of the Experimental Flight Rating Class 2 as "training course at an approved training organization" (Condition 2) according NPA 2008-17B.

This would also reflect the often cited "grandfather law" in NPA 2008-20.

response *Noted*

See EU Commission Regulation 1178/2011.

comment *43* comment by: *Austro Control*

ELA concept for CS-23 aircraft not taken into consideration.

response *Partially accepted*

ELA aircraft have been excluded from the requirements for qualification for flight test crew.

comment *44* comment by: *Austro Control*

1. Minimum standards for the EASA flight test crew missing

response *Noted*

It is expected that the EASA test team will comply with Part-21 including the

grand-father rules.
Furthermore the Company will have to address the point in its Flight Test Operations Manual.

comment *85* comment by: *Walter Gessky*

ELA concept for CS-23 aircraft is not taken into consideration.
Where are the minimum standards for the EASA flight test crews regulated?

response *Noted*

ELA aircraft have been excluded from the requirements for qualification for flight test crew.
It is expected that the EASA test team will comply with Part-21 including the grand-father rules.
Furthermore the Company will have to address the point in its Flight Test Operations Manual.

comment *151* comment by: *Giorgio Clementi*

Did the economic impact on industry consider the economic impact on non-military training providers? Three of the training providers are government sponsored organisations funded out of tax payers funds, the other enjoys a preferential relationship with the UK MOD after having obtained tax payer funded assets under highly advantageous terms. My organisation will have to pay any EASA fees for approval without any government assistance- Hardly a fair trade situation.

What assurance can be provided that the EASA fees will not be used as a means of raising the barriers to entering the industry or to exclude those not seen to have "international standing and recognition" by the above? (Regardless of market demand).

response *Noted*

EASA requirements and fees and charges will be applicable to all applicants.
The fees and charges are discussed with Industry (EU and non-EU) in working groups and the legislation is adopted by the EU Commission. The recitals of the regulations state as a principle that the fees and charges should be set in a transparent, fair and uniform manner.

A. Explanatory Note - B. Draft Opinion p. 16

comment *7* comment by: *Pieter DOYER*

response *Noted*

No text provided.

comment *169* comment by: *CEV. France*

CEV Comment n°2

Amendment to regulation (EC) No 1702/2003

Article 2f
Flight crew : definition of flight crew should be given somewhere.
Explanation : flight crew means usually pilots (FCL1/2) and flight engineer (FCL4). In this NPA, it appears that in the Appendix XII, there are two categories of people in the flight crew: Pilot and Flight test engineer. Therefore , in paragraph 2f, definition of flight crew must be given in accordance with Appendix XII.
Moreover, the fact that FTE's are part of a flight crew should lead to the attribution of a license. Two solutions could be imagined to solve this question:
- create a specific license for FTE, similar to the flight engineer license,
- impose a CPL to FTE and appose the flight test authorization on the CPL license

response *Noted*

Please see reply to comment 127.

comment *297* comment by: *ATR*

6/ DRAFT OPINION
A definition of a flight test engineer should be provided.

response *Noted*

Please see reply to comment 127.

A. Explanatory Note - B. Draft Opinion - new article 2f p. 16

comment *45* comment by: *Austro Control*

Item I. Article 2f:
Add the following to b) last sentence:
When Part-FCL is in force, any changes to the scope of their functions shall comply with the requirements of Appendix XII to Part-21.

Justification:
Grandfather clause has to be revised. What happens when after 18 month, when Appendix XII is in force, Part FCL is not effective and no flight test pilot with a valid flight test rating according Part FCL is available. Change to the scope of their function should be possible as long as Part-FCL is not in force.

response *Noted*

The date of adoption of this amendment to Part-21 and the date of adoption of Part-FCL will be coordinated.

comment *59* comment by: *ENAC*

This article is not consistent with the Regulation n. 216/08 Art. 5(4)(a) that requires, for the issuance of a permit to fly, that "the aircraft is capable of performing safely a basic flight" and adequate protection are given for "third parties' safety ". In fact the article allows to conduct certain flight tests, under permit to fly, without establishing adequate qualification for the test pilots (category 3 and 4).

response *Not accepted*

The requirements for category 3 and 4 of flight test are proportionate to the risks involved in such flights and therefore the safety of third parties is ensured.

comment

60 comment by: *ENAC*

Art.2f(b)
This article intends to grant privileges without taking into account the different regulations in force in European Member States. Some countries have already set down specific qualification requirements to conduct flight test activity in function of the different type of flight testing (experimental flying test, production flight ..). Some of them also requires issuance of dedicated licenses or qualifications.
Other countries do not require the same. Therefore, with the envisioned grandfathering rule, there is a risk to acknowledge the same level of competence to pilots and flight test engineers with different background and expertise not recognizing the dissimilar qualification, experience, competence and training.
In addition, the grandfathering rule does not foresee any evaluation or verification from the competent Authority in order to establish the appropriate category, although, according to FCL, the ratings should be released by the competent Authority.

response

Partially accepted

Following review of comments and discussions within the review group, the grand-father rule for pilots Category 1 and 2 is now based on a conversion report established by the competent authority.
For FTE and pilots performing Category 3 and 4 test, a rule has been introduced in the transition measures of the amending regulation to Part 21. The competent authority will establish the scope of function based on the information presented by the crew members and on the records held by the organization that employ them.

comment

71 comment by: *EADS CASA*

Article 2f requires that the requirements of Appendix XII become applicable 18 months after the Part 21 Amdt. Paragraph b of Article 2f states that flight crew participating in flight test activities at the date of entry into force of this regulation shall be considered as having complied with the Appendix XII requirements.
As requirements for flight crews involved in cat. 1 and 2 flights are not in Appendix XII but in Part FCL. A clarification is needed
Paragraph b of the proposed new Article 2f of the Regulation (EC) No 1702/203 states that flight crew participating in flight test activities at the date of entry into force of this regulation shall be considered as having complied with the requirements of Appendix XII to part 21 and may continue to exercise their present scope of functions..
As requirements for flight crews involved in cat. 1 and 2 flights are not explicit in Appendix XII but in Part FCL, a clarification in the proposed wording is needed to guarantee that pilots participating in flight test of category 1 and 2 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 Subpart I of Part FCL, and may continue to exercise their present scope of activities.
It is also proposed, in order to avoid discontinuities in the way of working that flight crews participating in flight test activities at the date of entry into force of

the new regulation, not only shall be considered as having complied with the Appendix XII requirements for their scope of activities, but to evolve or change tasks without the requiring additional external training.

response *Accepted*

There will be two grand-father rules: one in Part-21 and one in Part-FCL.
Following review of comments and discussions within the review group, the grand-father rule for pilots category 1 and 2 is now based on a conversion report established by the competent authority.
For FTE and pilots performing category 3 and 4 tests, a rule has been introduced in the transition measures of the amending regulation to Part-21: the principle is that the competent authority will establish the scope of function based on information presented by the crew members and on the records held by the organisation that employ them.

comment *78* comment by: *SABCA*

Proposed modification for paragraph (b):

"Flight crew members... may continue to exercise their present scope of functions"

The words "their present scope of functions" should be replaced by: "their scope of functions to be recognized by EASA"

JUSTIFICATION

As such, we do not see how this NPA will facilitate free circulation of flight test engineers in Europe. Except for the people having followed the CAT1 training course required, all other requirements are not precise. While this lack of precision has a great flexibility advantage, its main drawback is that recognition will be limited to the current organization and country the flight test engineer works for (except for CAT1).

While this might not be a problem for some countries where more strict requirements or an harmonization already exist, it is a problem for the very small flight test community of Belgium (the case of Belgium is certainly not unique in Europe, but it is the only one we can speak of). The very few current Belgian flight test engineers have none followed the CAT1 training course that will be required by the NPA, but do perform or have performed CAT1 testing with established competency based on other formations as well as experience. Also, they often work on both civil and military aircraft.

However, CAT1 civil testing does not happen very often in a small country like Belgium, and furthermore, the same people may work for extended periods on military aircraft testing, As a result, we fear that some engineers will loose their CAT1 (or all their civil) qualification when the amendment will be published, because they will be, at that time, doing for example only CAT2 civil testing, or military testing. And buying CAT1 approved courses will be a tremendous financial burden for the small Belgian companies. This could then result in concurrence distortion by requiring systematic use of foreign crews for CAT1, if only those can be found available.

Finally, some flight test engineers are performing consulting flight test work for

other countries; they have already been facing problems with mutual recognition from foreign authorities because no single document shows their locally-established level of competency.

Because of this, and in order to facilitate free circulation of the engineers, we suggest that the grandfather rule be implemented by issuing to each (military or civil) active flight test engineer that asks for it, an individual EASA certificate establishing the level of competency (CAT1, CAT2, CAT3, CAT4), based on current flight test activity OR individual record showing flight test courses followed, experience, etc... OR an examination or board hearing if deemed necessary. This is not a License, but a basic EASA recognition that would definitely facilitate the crews circulation. It does not prevent individual countries or organizations to issue more strict rules (like a License).

If the grandfather rule is not implemented that way, we think this NPA will miss its primary goal, that is, international harmonization & recognition of the test crews. Moreover, some experienced flight test engineers might loose their ability to work on civil aircraft. This is particularly true for CAT1 testing in Belgium.

response *Partially accepted*

The principle described in the comment has been accepted for the grand-father rule for pilot Category 1 and 2.
For FTE and pilots performing category 3 and 4 tests, a rule has been introduced in the transition measures of the amending regulation to Part-21: the principle is that the competent authority will establish the scope of function based on information presented by the crew members and on the records held by the organisation that employ them.
The wording of the grand-father rule will differ because there are no licenses or rating envisaged yet for FTE. This could change depending on the outcome of the process outlined in the reply to comment 127.

comment *86* comment by: *Walter Gessky*

Item I. Article 2f:
Add the following to b) last sentence:
When Part-FCL is in force, any changes to the scope of their functions shall comply with the requirements of Appendix XII to Part-21.

Justification:
Grandfather clause has to be revised. What happens when after 18 month, when Appendix XII is in force, Part FCL is not effective and no flight test pilot with a valid flight test rating according Part FCL is available. Change to the scope of their function should be possible as long as Part-FCL is not in force.

response *Noted*

The date of adoption of this amendment to Part-21 and the date of adoption of Part-FCL will be coordinated.

comment *112* comment by: *Luftfahrt-Bundesamt*

New Article 2f:
It is considered inappropriate to introduce the applicability clauses for flight crew competence and experience at the level of Regulation 1702/2003. The

scope of Regulation 1702/2003 as written in Article 1, No. 1 is to lay down "common technical requirements and administrative procedures for the airworthiness and environmental certification of products, parts, and appliances". More specifically, Article 1, No. 1 subparagraph (h) calls up certification of design and production organisations. As defined, the scope does not include any regulation applicable to individual persons, in this case flight crews. Therefore, the proposed Article 2f is considered outside the scope of Regulation 1702/2003 and should not be introduced.

To find the appropriate regulatory level, comparison should be made to other areas in Part-21 dealing with qualification of personnel. (Example: Certifying staff qualification and training requirements are found in AMC No 1 to 21A.145 (d)(1)). Consequently, formulating the flight crew competence and experience as an AMC to the related paragraph 21A.243 (a) would be sufficient and would offer more room for the flexibility needed in this business. Only the basic safety objective, i.e., to ensure that flight testing shall be done by suitably qualified personnel, should be located in Part-21. AMC No 1 to 21A.243 (a), data requirements for the DOA handbook, item 6 already asks for "A description of the human resources, facilities and equipment, which constitutes the means for design, and where appropriate, for ground and flight testing". This AMC No 1 to 21A.243 (a) is considered the appropriate regulatory level and place to specify flight test crew competence and experience.

response *Partially accepted*

paragraph 2(f)is meant to define the applicability date and the transition provisions. As such it should be in the cover regulation and not in Part-21. Part-21 paragraph 21A.708 introduces the obligation to comply with appendix XII.
It is agreed that the title of 2(f) does not reflect its nature and a more appropriate title will be found.

comment *122* comment by: *ECA- European Cockpit Association*

ECA proposes to add 8 words in Article 2 f b:

(b) Flight crew members participating **or having participated in the last 5 years** in flight test activities at the date of entry into force of this Regulation...

It may be possible that some well trained and experience crews do not perform test flights at the date of entry into force of this regulation, due to various reasons. This should not mean, in any case, that the grandfather right is not of application, if proper certification of such experience or training is done. By changing slightly the text, it may be possible to allow for such certification.

response *Partially accepted*

Please see reply to comment 78.

comment *143* comment by: *CAA CZ*

As there exists no common system of recording FTP/FTE qualifications for the time being in the EU Member States, we recommend to establish a common manner of showing competences and experience for the purpose of grandfathering of the FTP/FTE qualifications, e.g. in the AMC material.
Moreover, to the proposed Article 2f we would like to recommend to include a time aspect for grandfathering competences and experiences of FTP/FTE. For

example: will the qualifications for flight tests of FAR 25 category aeroplane and CAT 1 be grandfathered in case where FTP/FTE was involved in flight tests of the aeroplane in question, including CAT 1 flights, conducted for the last time in 1999?

response

Partially accepted

For test pilots category 1 and 2, the method is a conversion report and the evidence is the issue of the relevant rating.
The present scope of functions of FTE and cat 3 and 4 pilots shall be established by the applicant or holder of a permit to fly based on relevant records of flight experience or training.

comment

164 comment by: *Italian Air Force Test Center*

Generally, a great amount of experimental test pilots and experimental flight test engineers are also qualified as instructors upon graduation from a TPS, in relation to teaching flight test techniques at different levels (i.e. an experimental test pilot is also qualified to act as an instructor in a Test Pilot School or in a school required to form Production Test Personnel without having any other specific instructor training). This subject is not treated in the document and it should be clearly ruled out.

response

Noted

You need to be a flight test instructor to provide Category 1 or Category 2 flight test training.
Lead flight test engineer instructor rating is not requested as the corresponding training needs not to be done in an approved training organization.

comment

176 comment by: *President, Society of Experimental Test Pilots*

New Article 2f:

(b) … and may continue to exercise their present scope of functions *indefinitely*. Any changes to the scope….

Added the word indefinitely to the above statement.

Concern: Without further clarification, flight test crew members currently performing category 1 and 2 flight tests could lose the ability to perform tests they are already qualified to do.

Reason: Requiring all flight test crew members currently participating in category 1 and 2 flight test activities to comply with completion of a lengthy training course to ratify and develop skills they already possess would be unnecessary and unproductive.

response

Not accepted

See Commission Regulation (EU) 1178/2011.

comment

199 comment by: *Federal Department of Defence,Civil Protection and Sport DDPS, armasuisse, Flight Test*

The grandfather rule shall not only be applicable to flight test pilots engaged in

active flight test for all conditions, but also for flight test pilot currently not in active flight test, owing valid CPL and having successfully passed the required training or experience. Smaller organisation may do not have continuously ongoing test programmes, and thus the flight test crews would not be able to take credit of the grandfather rule.

For the same reason, any licence endorsement for flight test crews shall not be limited by recurrency requirements.

Military flight test shall be considered as equivalent to civil flight test activities, as similar methodologies and flight test techniques are applied.

EASA should also develop a mechanism for mutual recognition of testpilot endorsement by other governing agencies, e.g. the FAA.

response *Partially accepted*

See Commission Regulation (EU) 1178/2011.

comment *214* comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD.

AFFECTED PARAGRAPH:
Regulation (EC) 1702/2003, Article 2f – Competence and experience of flight crews participating in flight test activities

PROPOSED CHANGE:

(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*~~ *activities, as defined by their function onboard and the categories of aircraft and flight tests for which they are authorised.* Any changes to ~~*the scope of their functions*~~ *these elements* shall comply with the requirements of Appendix XII to Part-21.

JUSTIFICATION:

· "Scope of functions" leaves too much room to interpretation and needs to be replaced by a more precise language.

response *Partially accepted*

For flight test engineers and pilots performing category 3 and 4 of flight test a rule has been introduced in the transition measures of the amending regulation to Part 21: the principle is that the DOA/POA holder will establish the scope of function based on the information presented by the crew members and on the records held by the organization that employ them.

comment	*293* comment by: *ATR* 2/ DRAFT OPINION, Amendments to Regulation (EC) 1702/2003, Article 2f, (b) Last sentence should be read: "Any change to the **category of flight tests a flight crew member is engaged in,** shall comply with the requirements of Appendix XII to Part 21." - The terms "scope of function" is not detailed enough.
response	*Accepted* For flight test engineers and pilots performing Category 3 and 4 of flight test a rule has been introduced in the transition measures of the amending regulation to Part 21: the principle is that the DOA/POA holder will establish the scope of function based on the information presented by the crew members and on the records held by the organisation that employ them.

comment	*308* comment by: *Fokker Services* (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. **How are these grandfather rights formalized? Will there be an issueance of some sort of individual license for currently active flight crews? Are there any requirements for definition of scope in terms of training or experience? Who is to approve the applications of these licenses?**
response	*Noted* For flight test engineers and pilots performing Category 3 and 4 of flight test a rule has been introduced in the transition measures of the amending regulation to Part 21: the principle is that the DOA/POA holder will establish the scope of function based on the information presented by the crew members and on the records held by the organisation that employ them.

A. Explanatory Note - B. Draft Opinion - Part-21 Contents p. 16

comment	*113* comment by: *Luftfahrt-Bundesamt* Contents [of Part-21]: All appendices currently available in Part-21 are dedicated to detail the EASA forms. Refer to the lead-in sentence in Part 21. Changing the table of contents from "EASA forms" to "Appendices" would introduce a new quality in writing Part-21. This is not supported. There is no justification that this is appropriate to the spirit of Part-21, therefore the new material should be implemented in a way consistent with the existing Part-21 philosophy. Within this set of comments, an AMC is proposed instead. Refer to other comments in this set.
response	*Not accepted* It is accepted that present appendices to Part-21 are related to forms.

However, the EASA rulemaking framework does not prevent to create appendices that are not only related to forms. Appendices are binding. An AMC is not binding and would not provide legal certainty.

comment

231 comment by: *Boeing*

Page: 16
Section I. Amendments to Regulation (EC) No 1702/2003; New Article 2f., paragraph (b)
Boeing suggests that the following change be made:

> *"(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 **indefinitely**. Any changes to the scope of their functions shall comply with the requirements of Appendix XII to Part-21."*

JUSTIFICATION: Without further clarification available in the NPA, it is unclear whether a flight crew member would be required to comply with the training requirements of Appendix XII to Part 21 after the requirements of this Appendix become applicable, 18 months following publication. Is the grandfather rule intended to be temporary (18 months) or non-expiring?

Requiring all flight test crew members currently participating in Category 1 and 2 flight test activities to comply with completion of a lengthy training course to develop skills they already possess would be an unnecessary burden on the test organization.

response

Partially accepted

There is no currency requirement in the regulation for flight test crew: the FTOM defines the company policy on this issue. The AMC to the FTOM provides guidance on such policy should be.

comment

278 comment by: *Rolls-Royce plc [DGJ]*

It seems that the activities carried out by a Flight Test organisation are quite distinct and might have warranted their collection together in one place rather than distributing them across subparts G, J and P with multiple cross-references (particularly for the AMC). Furthermore, if collected together, they might more naturally fit into the proposed new structure of Regulation as presented in NPA 2008-22.

response

Noted

The distribution in several rules was unavoidable to be in line with the EASA agreed structure of rules. For example, FCL is only applicable to pilots due to article 7 of the Basic Regulation that addresses pilots only. In addition, putting the requirements for flight test training organisations in the Part OR allows for a general consistency with other training organisations avoiding thus to create a specific system for flight test training organisations.

A. Explanatory Note - B. Draft Opinion - Subpart G - para 21A.143 p. 16

comment *51* comment by: *Diamond Aircraft Ind. GmbH*

There is no need for a flight test operations manual for production test flight purposes.

Justification:

For obtaining the production privilege for production test flights with issuing permits to fly and approve flight conditions for that purpose there are procedures required by Part-21 Subpart P and the relevant AMC/GM.

These procedures are agreed with the competent authority after the investigation of all relevant items including the organisation of production flight testing is completed successfully.

There was no need for a FTOM for production test flights at that time and from our point of view there is still no need for an additional manual for that purpose.

response *Noted*

FTOM may be a stand-alone document or be included into existing documents. The contents are important as they define the policy of the company concerning flight test safety.

comment *61* comment by: *ENAC*

2. Paragraph 21A.143
This paragraph imposes a flight test operations manual. This for some organisations could be an undue burden. Furthermore, the rule does not set down requirements for the production organisation to be approved for managing the flight test activities. These requirements should include roles, competence and responsibilities of the personnel involved., A flight test operations manual in itself is not a guarantee that production flight test is performed correctly.
Otherwise we should reach the conclusion that the production organisations currently certified are not providing an adequate level of safety, when they perform the flight test activity.

response *Noted*

FTOM may be a stand-alone document or be included into existing documents. The contents are important as they define the policy of the company concerning flight test safety.

comment *70* comment by: *Austro Control*

1. **Item II/2,**

   Add to § 21A.143 the following:
   "Flight training for flight test pilots category 1 and 2 might be done without a ATO according Part FCL/OR when the policy is included in the flight test manual./

Justification:#
Similar to Part 66, 147 and 145 a POA should be able to carry out flight training for FTP in house when adequate procedures are approved by the competent authority and coordination is shown with an approved Trainings Organization.

2. **Item II/3,**

Add to § 21A.243(a) the following:
"Flight training for flight test pilots category 1 and 2 might be done without an ATO according Part FCL/OR when the policy is included in the flight test manual.
Justification:
Similar to Part 66, 147 and 145 a DOA should be able to carry out flight training for FTP in house when adequate procedures are approved by the competent authority and coordination is shown with an approved Trainings Organization.

response

Not accepted

In order to give a recognition to individual pilots and because the training for category 1 and category 2 is generic to flight test, the category 1 and 2 are recognised by a rating on an FCL licence. As a consequence training must be done in approved organisation which is reasonable, keeping in mind that these requirements are only applicable to aeroplanes above 2 000 kg.

In addition, production organisations are expected to do Category 3 flight test only (Category 3 is production Flight test). In such case training can be done outside an approved training organisation.

For further see Commission Regulation (EU) 1178/2011.

comment

87 comment by: *Walter Gessky*

Item II/2,
Add to § 21A.143 the following:
"Flight training for flight test pilots category 1 and 2 might be done without a TOA according Part PCL/OR when the policy is included in the flight test manual and the flight test programme is coordinated with a certified trainings Organisation.
Justification:
Similar to Part 66, 147 and 145 a POA should be able to carry out flight training for category 1 and 2 FTP in house, when adequate procedures are approved by the competent authority and coordination is shown with an approved Trainings Organization.

response

Not accepted

For further see Commission Regulation (EU) 1178/2011.

comment

114 comment by: *Luftfahrt-Bundesamt*

Subpart G, 21A.143:

	The words "must be furnished" should be deleted, since the lead in sentence of 21.A143 already says "...shall submit ... the following information."
response	*Accepted* Text to be modified accordingly.

comment	*126* comment by: *ECA- European Cockpit Association* **Add 10 words to Ammendment to PART 21, Section A, Subpart G - 2. Paragraph 21A.143:** A flight test operations manual recording significant organisation's policies relative to flight test***, defining the roles, competencies and responsibilities of the personnel involved*** must be furnished if flight testing is to be conducted. The rule does not set down requirements for the production organisation to be approved for managing the flight test activities. A flight test operations manual in itself is not a guarantee that production flight test is performed correctly. These requirements should include, among other things, the roles, competences and responsibilities of the personnel involved. Otherwise we should reach the conclusion that the production organisations currently certified are not providing an adequate level of safety, when they perform the flight test activity.
response	*Noted* FTOM may be a stand-alone document or be included into existing documents. The contents are important as they define the policy of the company concerning flight test safety.

comment	*268* comment by: *European Sailplane Manufacturers* Whereas in the introductionary part of this NPA it is stated several times that applicability of this NPA shall not be for the "small" categories (e.g. CS-22, CS-VLA) this proposed amendment of 21A.143 will require a flight test operations manual for all POA holders. For the reasons stated in our general comments the sailplane manufacturer oppose this wording. At least a limitation to the "bigger" categories of aircraft (e.g. CS-23, CS-25, etc.) is needed here. Better would be the clear exclusion of ELA aircraft for the applicability of this new requirement. The need for just another manual to be approved is too burdensome for very small companies producing very small and simple aircaft and this is also reflected in the concept of this NPA which does not require special procedures for the aircrews doing flight test on the "small" categories.
response	*Noted* FTOM may be a stand-alone document or be included into existing documents. The contents are important as they define the policy of the company concerning flight test safety.

A. Explanatory Note - B. Draft Opinion - Subpart J - para 21A.243 p. 17

comment *22* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

DOAs may use external resources for Flight Tests. In this case reference to a third party Flight Test Operations Manual (FTOM) should be possible without the need to develop a FTOM "in house". This may also be mentionned in the AMC to this chapter 21A.243.

response *Noted*

According to 21A.239, the DOA shall specify the manner in which the design assurance system accounts for the acceptability of ... the tasks performed by contractors or sub-contractors according to methods which are the subject of written procedures. This is also applicable to flight test. The FTOM should include a paragraph relative to contractors or sub-contractors which is defined in the revised AMC as follows: When test flights are done by contractors or sub-contractors, they should comply with the FTOM of the main organisations, unless they have established an FTOM in compliance with Part-21.

comment *62* comment by: *ENAC*

3. Paragraph 21A.243
This paragraph imposes a flight test operations manual. However, the rule does not set down requirements for the design organisation to be approved for managing the flight test activities. These requirements should include roles, competence and responsibilities of the personnel involved.

response *Noted*

The DOA rules are applicable to all its activities including flight test when the organisation performs flight test. There were no specific requirements or guidelines for flight test up to now: the purpose of this NPA is to provide such elements thus improving standardisation.

comment *88* comment by: *Walter Gessky*

Item II/3,
Add to § 21A.243(a) the following:
"Inhouse Flight test training for flight test pilots category 1 and 2 might be done without a FTO according Part FCL/OR when the policy is included in the flight test manual and the flight test programme is coordinated with a certified trainings Organisation.

Justification:
Similar to Part 66, 147 and 145 a DOA should be able to carry out flight training for FTP of category 1 and 2 in house, when adequate procedures are approved by the competent authority and coordination with an approved Trainings Organization is available.

response *Not accepted*

See Commission Regulation (EU) 1178/2011.

comment	*115* comment by: *Luftfahrt-Bundesamt* Subpart J, 21A.243 (a): Replace "must be furnished" by "shall be furnished" to maintain the language of this paragraph.
response	*Not accepted* Text modified accordingly.

comment	*146* comment by: *ERA* **Proposed change:** **B. Draft Opinion** **II. Amendments to Part-21** **SUBPART P - PERMIT TO FLY** **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** (b) Categories of flight tests (3) Category Three • - Flights performed prior to the application (Form 52 or equivalent) for of an individual certificate of airworthiness in order to establish the conformity of the relevant aircraft production to the approved type design. **Rationale:** The flights performed to establish the conformity to the approved type design are definitely Category 3. But the flights performed just after the declaration of conformity may not be considered Category 3 anymore, even if the individual CoA has not been actuelly issued. This is in particular the case of the Customer Acceptance Flights, generally performed before issuance of the individual CoA. The present wording would place such flights in Category 3 but they are obviously not. The proposed wording make it possible to consider them as not being Flight Tests.
response	*Not accepted* The purpose of a Category 3 flight is to check conformity with approved design and this is not the purpose of the customer acceptance flights. They are not covered by this definition as soon as the aircraft to be delivered has received its individual certificate of airworthiness. Category 3 flights will be defined: 'Flights performed for the issuance of statement of conformity for a new-built aircraft which do not require flying outside the limitations of the type certificate(TC)/ aircraft flight manual (AFM)'

comment	*247* comment by: *KLM EASA DOA 21J.012* (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.~~

We suggest this part to be listed under Category 4, [no additional (un)known risk]

We suggest to list here the text from Category (4) :

-" *Flights performed after embodiment of a new not yet approved design change which do need an (re-)assessment of the general behavior of the aircraft and/or the impact on crew procedures when the new or modified system is operating."*

(As phrased here an assessment is required to establish the behavior and impact on crew procedures. In other words flights for development of new certification- and/or flight- values and limitations, unpredictable- but calculate able, low/medium risk)

response

Noted

The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary Category 2 and Category 4.
Definition s of category 2 and 4 were deeply reviewed to accurately define each categories.

comment

269 comment by: *European Sailplane Manufacturers*

Whereas in the introductionary part of this NPA it is stated several times that applicability of this NPA shall not be for the "small" categories (e.g. CS-22, CS-VLA) this proposed amendment of 21A.243 will require a flight test operations manual for all DOA holders.

For the reasons stated in our general comments the sailplane manufacturer oppose this wording.
At least a limitation to the "bigger" categories of aircraft (e.g. CS-23, CS-25, etc.) is needed here.
Better would be the clear exclusion of ELA aircraft for the applicability of this new requirement.

The need for just another manual to be approved is too burdensome for very small companies producing very small and simple aircaft and this is also reflected in the concept of this NPA which does not require special procedures for the aircrews doing flight test on the "small" categories.

response

Noted

FTOM may be a stand-alone document or be included into existing documents. The contents are important as they define the policy of the company concerning flight test safety.

comment

294 comment by: *ATR*

3/ DRAFT OPINION, Amendments to Regulation (EC) 1702/2003
Add another article : "**Flight test operations manual : The requirements asking for a FTOM, established in 21A.143 and 21A.243, shall become applicable 12 months following publication of this amendment to Part 21.**"

- It is necessary to let a delay to Flight test organization to issue a FTOM or to update existing manuals with regards to new requirements.

response *Not Accepted*

The regulation regarding the FTOM will enter in force 20 days after its publication in the Official Journal. The text will be modified to provide a 12 months transition period.

A. Explanatory Note - B. Draft Opinion - Subpart P - para 21A.708 p. 17

comment *23* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

It may also be added to this Subpart P paragraph that a Flight Test Operations Manual (FTOM) is required and that the Flight Conditions must be compliant with this FTOM.

response *Not accepted*

Including the requirements for FTOM in subpart G and J is deemed sufficient. In addition permit to fly are issued for other purposes than flight test.

comment *63* comment by: *ENAC*

Paragraph 21.A 708

Not all the flights conducted under approved flight conditions are for flight test. As an example, flight conditions may be approved for an aircraft to be flown to a repair station. So, if the intent to specify the type of crew required is maintained, the wording should be changed as follows:

1. *The conditions and restrictions put on the flight crew to fly the aircraft. If the approval is sought for flight testing, flight crews involved shall comply with the conditions defined in Appendix XII to this part.*

response *Noted*

This is the intention of the present wording which is not changed.

comment *116* comment by: *Luftfahrt-Bundesamt*

Subpart P, 21A.708 (b)(2):
The text added to 21A.708 (b)(2) is worded such that the involved flight crews are required to comply with this requirement "flight crews involved in flight tests shall comply...". Such requirement is considered outside of the scope of 21A.708 which is intended to define the flight conditions. The existing text of 21A.708 (b)(2) is sufficient in order to specify the conditions for crewing as one item within the flight conditions. The requirement that a specific flight crew must meet the conditions given in the flight conditions of an airplane would be

more appropriately placed in the AMC defining the organisation's flight test operations manual. In fact, paragraph (c) of the proposed AMC to 21.A139, 21.A243, 21.A14(b), 21.A112(B)(b), 21.A432(B)(b) includes this requirement. Therefore, an additional text change in 21A.708 is not well placed and not needed to achieve the desired objective. Therefore, it should be deleted. If more emphasis on this subject was desired, the outline of the flight test operations manual could be expanded accordingly.

response

Noted

The intent of adding this wording in 21A.708 was to specify the conditions for flight test. The origin of the rulemaking task was a request from ASD to harmonise the qualifications for the crew. To achieve legal certainty it was necessary to modify subpart P and to add an appendix.

comment

281 comment by: *Thales Flight Test Directorate*

Attachment #3

Comment from Thales Flight test directorate

response

Noted

Please see response to individual Airbus/ASD comments.

comment

283 comment by: *Southern Cross International*

The categories of flight test and associated competence and experience of the flight crew should be based on a hazard analysis rather than a type of test. Mitigating factors, such as a specific additional training, previous experience, computer simulations, telemetry etc, should be taken into account to determine a risk level which in turn determines the category of flight test and associated pilot requirements. Guidance material or AMC must be provided to perform such a hazard analysis.

response

Noted

The FTOM should describe the organisation's policy relative to risk and safety assessment, mitigation and associated methodologies.
The method proposed by the commentator is an alternative to the categories of flight but because we have associated ratings with categories of flight, it would be difficult to implement.
The definition of the categories is based on a qualitative evaluation of the risk and complexity of the tests it includes that is based on present industry practice.

A. Explanatory Note - B. Draft Opinion - new Appendix XII p. 17-21

comment

12 ❖ comment by: *Pilatus*

A.1 Introduction
Pilatus Aircraft Ltd. have reviewed EASA Notice of Proposed Amendment (NPA) No. 2008-17b and NPA No. 2008-20 and recognises the value in attempting to establish guidelines for flight test operations and to standardise the qualifications and experience of flight test crews. Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed

in accordance with a documented process very similar to that proposed by the NPA. However, Pilatus considers that the proposed regulation does not give sufficient credit for taking a balanced approach to the qualifications and experience of flight test crews operating in an existing safe and proven environment. Namely, to use highly qualified and experienced supervisors to monitor the activities of personnel with considerable type and role experience. It is the assertion of this company that the proposed amendments will not, in all cases, have the effect of improving standards of practice in flight test, but indeed could have the opposite effect as outlined below. In addition this proposal may have a significant adverse effect on the proven and successful flight test activities currently conducted.

A.2 Categories of Flight Test

Categorising flight test into 4 broad categories is something that most personnel engaged in this vocation would agree upon, but difficulties emerge when attempting to place every type of flight test conducted at Pilatus Aircraft Ltd. into one or other of these categories. For example, specialised avionics test flights, which require pilots with appropriate military or civil experience, would in future need to be carried out by test crews with new qualifications but who may lack the appropriate role experience. That is why Pilatus Aircraft Ltd. believes that it is more appropriate to follow a balanced, supervisory approach where experience in the role and on type provides a more efficient and safe solution.

A.3 Categories of Aircraft/Engine Type

The NPA splits CS-23 aircraft into categories, to permit a structured approach to crew competence levels depending on the complexity of the aircraft to be tested. While this is considered a practical approach, the reason for placing CS-23 jet aircraft in a higher category than CS-23 turboprop aircraft (which can be more complex than turbojets/turbofans both mechanically and in terms of their effects on aircraft handling and performance) is not clear. There is no precedent in current test pilot training schools to suggest that testing of a jet-powered aircraft requires any greater qualification or training than testing of a turbo-prop powered aircraft. This differentiation would seem unreasonable, resulting in unnecessary restrictions for those testing jet-powered aircraft. It is suggested that a better split would be between single- and multi-engine aircraft (of whatever engine type) due to the additional testing required for multi-engine aircraft. This would better fit with paragraph 17 of the NPA, which states: "The competences and experience depend on 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.4 Flight Test Aircrew Training and Experience

This company has a proven track record of producing and certifying high quality aircraft, and has done so employing many individuals without the formal qualifications proposed in this NPA. Mandating such qualifications across the board, however, would prevent many members of the Pilatus flight test team from continuing their work, and will have considerable detrimental effects on the company's ability to conduct a high proportion of future flight tests.

It is considered that attendance of a "specific course" should not be the only acceptable means of satisfying the training and experience requirements for flight test crews. Introduction of the proposed amendment could result in individuals with the required formal qualification but far less experience on type replacing individuals with less qualification but significantly more experience on type. This would not necessarily represent an improvement in standards of

flight test and safety, but could indeed represent the opposite.

Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process. The process is continuously audited and strictly supervised by a Head of Flight Test (FTE) with 25 years flight test experience and a Chief Experimental Test Pilot with all the qualifications required by the NPA. Therefore a suitable supervisory system is utilised with individuals of considerable experience and qualifications supervising the flight test process, as well as ongoing training in flight test related skills.

Flight test personnel are selected for a given task based upon their knowledge and suitability for that task. Training is provided as required by experienced Pilatus staff, external consultants or by attending an approved training course as considered appropriate.

It is suggested that alternative training for staff engaged in all types of testing could be accepted as follows:

- Internal training given by experienced staff who have a proven track record in the industry (and who have been approved by the national authority) should be permitted.

- Experience in flight testing of similar aircraft, either within the company or from previous appointments, should be taken into consideration (including in-house training for all types of aeroplanes). It may be necessary to approve these on a case-by-case basis to ensure that the training received is appropriate to the task to be undertaken. This would also apply to any external crew brought in to carry out an assessment, and could be administered using the Permit to Fly procedure.

The test pilot or FTE must be sufficiently experienced to cope with normal and emergency situations. To cover this, flying currency in the same class of aeroplane as that to be tested, should be maintained (including recent experience of manoeuvres similar to those to be tested). Relevant training (including aeromedical, safety equipment, ejection seat and survival training) as appropriate to the aircraft to be tested should be provided and the aircrew member must be physically fit to the level required to fly in the test aeroplane. Guidelines on acceptable levels of training and timescales for currency (both flying currency and aeromedical/survival training) should be drawn up and publicised.

A.5 Specifications for test pilot school courses

Pilatus personnel have undertaken short courses at the various recognised test pilot schools. In some cases these courses do not comply with the seemingly arbitrary requirements set by NPA-17b. In particular the requirement to fly 12 different fixed-wing types during a 15 week course seems quite unreasonable. It is reasonable to suggest that more experience on a far fewer number of aircraft similar to those under test at the test pilots company is more appropriate from an efficiency and safety point of view.

The intention of the 10 month course (required for condition 1 experimental

flight test in the NPA) at these schools must also be considered. This course is offered with the intention of training government-sponsored test crews to carry out all possible future government test programmes, and as such offers significant training in such subjects as fly-by-wire flight control systems and transonic handling characteristics. Such training would clearly represent an unnecessary waste of time and money for a commercial organisation such as Pilatus Aircraft Ltd.

A.6 Conclusion
Pilatus Aircraft Ltd. flight test personnel will, at one stage or other, be involved in every type of flight test as defined in the proposed amendment. This company takes a responsible and balanced approach to its flight test personnel, as it would be prohibitively expensive to employ exclusively graduate test pilots and graduate flight test engineers from the 5 recognised schools. Pilatus believes that a balanced approach to crew experience, combined with on-the-job training, and appropriate specialised training, and defined and proven practice and process would meet the intent of the NPA and enhance flight safety with an acceptable level of investment without significant financial burden on the industry. Therefore Pilatus can not agree to the content of this NPA and specifically opposes the requirements set forth in A.3, A.4 and A.5.

response

Not accepted

A.1 Introduction:
The Agency has reviewed the comments with a review group where Industry and Flight Test Training Schools were represented. We believe that the changed text represents a minimum standard for safety. **As this standard covers a significant breadth and depth of knowledge, it will help crews moving to one aircraft to another or to approach new technologies**. A grand-father clause has been introduced to allow existing flight test crews to continue doing their job. Monitoring the flight test activities will be done using the flight test operations manual.

A.2 Categories of Flight Test:
The 4 categories are covering the vast majority of flight tests to be performed. We expect that the flight test operations manual would provide the necessary complements to cover the kind of specific flights described here.

A.3 Categories of Aircraft/Engine Type:
Agreed, the criteria of propulsion has been replaced by a criteria of performance (Speed and altitude). In that context, we felt that there was no need to further distinguish between single and twin engine aeroplanes.

A.4 Flight Test Aircrew Training and Experience:
Please see response to A1.

A.5 Specifications for test pilot school courses:
We have now established detailed syllabus in cooperation with the schools and Industry.

A.6 Conclusion:
Please see reply to A1.

comment *24* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

	The title doesn't seem to be appropriate because cases 1 and 2 are also addressed in this Appendix (with reference to Part FCL). The text "*engaged in categories 3 and 4 of flight testing*" should then be removed.
response	*Accepted* Title will be modified.

comment	*25* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc* It is arguable to impose a significant amount of flight experience on Flight Test Engineers if his/her task doesn't include flying. It is then proposed to put the same requirements for CAT 1 and CAT 2 regarding Flight Test Engineers.
response	*Accepted* The appendix XII has been rewritten to clarify that such experience applies only to the LFTE that has a dedicated role in flight.

comment	*34* comment by: *ADAC Luftfahrt technik* Category 2 does not seem to be logical. Items one and three describes an uncritical flight test procedure, which should be category 4, whereas item two describes a non-TCed aircraft (which should be category 1 in our opinion).
response	*Noted* The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary Category 2 and Category 4.

comment	*52* comment by: *Diamond Aircraft Ind. GmbH* Appendix XII b (3) IS "Flights performed prior to issuance of an individual certificate of airworthiness" SHOULD BE: "...issuance of statement of conformity (EASA From 52)" Justification: Issuing a certificate of airworthiness is an authority task (see Part-21 Subpart H). There is no benefit in mixing organisation tasks with authority tasks.
response	*Not accepted* It is clear that the authority issues the certificate of airworthiness and that the manufacturer issues the statement of conformity. The difference between using one or the other reference would be the time for the Authority to issue the certificate of airworthiness. This does not seem to make a big difference in practice and the wording is kept.

comment 53 comment by: *Diamond Aircraft Ind. GmbH*

Appendix XII
c table CAT 3 IS "...issuance of an individual certificate of airworthiness"
SHOULD BE: "... issuance of statement of conformity (EASA From 52)"

Justification:

Issuing a certificate of airworthiness is an authority task (see Part-21 Subpart H)
There is no benefit in mixing organisation tasks with authority tasks.

response *Not accepted*

It is clear that the authority issues the certificate of airworthiness and that the manufacturer issues the statement of conformity. The difference between using one or the other reference would be the time for the Authority to issue the certificate of airworthiness. This does not seem to make a big difference in practice and the wording is kept.

comment 64 comment by: *ENAC*

Appendix XII

No qualification is established for flight crew involved in CS 22, VLA, VLR flight testing activities. ENAC does not consider acceptable that experimental flight test or testing for showing compliance with the Certification Specification are carried out, for these classes of aircraft, by pilots and flight test engineers without qualification, competence and training adequate to the scope. Whenever a flight test activity is needed to open the aircraft flight envelope and assess the flight characteristics for a new type or for changed aircraft there is a need for a solid qualification and background. In the last years ENAC has accumulated significant experience with the certification of VLR and VLA aircraft and the lesson learnt is that although systems of these aircraft are less complex than other categories, nevertheless the difficulties faced during the flight test activity are the same as bigger aircraft. Therefore ENAC opinion is that this article is not consistent with the Regulation n. 216/08 Art. 5(4)(a).

(b) (1) in the definition of Category One flights reference is made to "extreme" conditions. The definition of extreme conditions may be matter of discussion and therefore a revision of the definition is recommended.

(b) (2) the definition of Category Two flights can lead to some misinterpretation, in particular when compared to Category Four flights. As a matter of fact, all flights needed to determine regulatory performances and handling characteristics could be classified as Category One.

(**b)(3)** Category Three flights are the so called production flight tests. In many European countries pilots authorised to perform such flights must undergo specific and recognised training schools. This system has performed well so far and therefore it is not clear why the level of qualification required for these pilots has to be changed.

(b)(4) Category Four flights are characterized by the assumption that there is

"*no need of the assessment of the general behaviour of the aircraft*". Such definition appears to be too generic and not so different from Category Two flights(Category Two flights are allowed within already opened approved envelope) so that some overlapping between the two categories can not be excluded.
ENAC opinion is that Category Four flights should be those dedicated to the investigation of minor changes or changes that do not affect aerodynamic characteristics of the aircraft.

c) (2) A Part-FCL licence is required for pilots but it is not clear if pilots holding PPL are eligible to carry out flight test activities.

(c) (2) Results of flight activities carried out under the provisions of Category Three flights are essential to release the form 52 on the basis of which the C.of.A can be issued by a NAA.
As a consequence ENAC believes that the role of the production test pilot is important and he/she has to be qualified and trained adequately. The requirements set in the table included in Appendix XII call only for a type or class rating issued in accordance to Part-FCL. This level of qualification is not deemed enough to the scope.
As of today, production test flight courses are held by different military and civil training organisations. In many countries, the satisfactory completion of a training course of such type is a prerequisite to grant the qualification, necessary to carry out this activity.
Usually manufacturers do not have training capabilities to qualify and assess pilots to this scope. This is specially true for small organisations where only the personnel strictly necessary to the production tasks are employed. So this will create difficulties to these small companies or a significant decrease of the level of qualification

(c)(2) Category Four flights can be performed by personnel appointed by the organisation performing the flight tests. This approach does not take in to account the different level of expertise of the companies requiring a change approval. This may be acceptable for large companies with well established flight test procedures and knowledge. As a matter of fact, the typical scenario is that small companies are involved in category four flights and they have limited or no capability of assessing the qualification of flight test personnel. This is the reason why some countries requires a level of qualification that is assessed by the NAA through the issuance of specific ratings and licenses. The requirement to "*have been informed of the change to type design for which the flight tests are to be undertaken*" is very generic. Who is responsible within the organisation to provide such a briefing and guarantee that this is enough to carry out a flight for demonstration of compliance? A briefing cannot provide a substitute competence, considered that he/she has to ensure that a safe basic flight is conducted and assess any non conformity or non compliance to certification specification. Therefore this article is not consistent with the Regulation n. 216/08 Art. 5(4)(a).

(c) (2) ENAC do not envisage any rationale for a different qualification and training between flight test engineers necessary to carry out Category One and Category Two flights.

(c) (2) Flight test engineers for category tree activities need to be adequately qualified for production activities.

	(c) (2) ENAC believe requirements for flight test engineers for Category One and Two activities are inappropriate. As a matter of fact, table in Appendix XII requires for Category One flights the satisfactory completion of a specific training course accepted by the Agency while for Category Two flights a flight test engineer must have gained significant amount of experience relevant for the task and must have been trained for flight testing activities. The first and main problem envisaged with these requirements is they make reference to the experience only for Category Two flights, so leading to the situation where a flight test engineer just qualified through a specific training course accepted by the Agency can participate to Category One flights, without an adequate background of flight experience. Category One flights are by definition those where an adequate level of qualification and experience is required and therefore for this class of flights the experience must be required. This is also the standard approach implemented by all the companies that have well established flight testing procedures. For Category Two flights it could be accepted a reduced level of experience. So for the above reason, criteria established for these Categories of flights are considered unacceptable by ENAC. The second problem is the definition of significant amount of flight experience. We all know what, according to Part 21, significant means for a change but we do not know what could be the correct interpretation for the scope of flight test personnel.
response	*Noted* We have limited the applicability of Appendix XII. This means that for the categories of aircraft not included, the composition and qualifications of the crews are reviewed on a case by case basis when approving the flight conditions or by approving an FTOM that will define such composition and qualifications. This will allow to gather experience and prepare a future rulemaking task. The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary category 2 and category 4. Possibility for having a PPL licence: the assumption is that for the aircraft affected by appendix XII, flight crew members will perform flight test on a professional basis and receive some form of remuneration. This is not compatible with the privileges of a PPL as listed in FCL.205.A for example. Therefore the 'minimum' licence is a CPL. The text of appendix XII will be modified to clearly reflect the need for a CPL for Category 3 and 4 of flight test. CPL/IR is already required by FCL.820 to obtain the flight test ratings for Category 1 and Category 2. Category 3 flight: we understand the concern but we believe that the requirement that for each class or type of aircraft, they must have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness ensure adequate preparation. Category 4: the procedure for category 4 need to be part of the FTOM that will be approved as part of the company approval. Concerning FTE, This opinion will define FTE and LFTE and contain safety requirements for their experience, medical fitness and training (including detailed syllabi) for FTE only. Competence and experience of FTE which are not LFTE will have to be defined by each DOA or POA holder in the FTOM. It will also propose the necessary transition measures, including grand-fathering

rules. Compliance with the requirements will be confirmed by the Part 21 organisation employing the FTE. We believe that the provisions included into revised appendix XII provide an adequate level of safety. In addition, we think that the requirements are matched to the category of flight test.

comment *72* comment by: *Austro Control*

1. **Item 5, Appendix XII:**

Change the text:
Add a new Appendix XII, Competence and experience of flight test *crew* ~~engineers and of pilots~~ engaged in ~~categories 3 and 4 of~~ flight testing
Justification:
The appendix is effective for the flight test crew. Under c.1are the requirements for Category 1 and 2 FLP regulated (reference to Part-FCL). For other FT crew members (category 3 and 4 and flight test engineers) the requirements are regulated in detail in the Appendix.

response *Accepted*

Title has been modified to reflect more accurately the content. "Categories of flight and associated flight test crew qualifications".

comment *73* comment by: *Austro Control*

1. **Item 5, Appendix XII:**

Add the following after c) (1)
(2) Conduct of flight tests
Pilots should only be involved in category 1 and 2 flight tests when the hold the proper Part-FCL condition 1 or 2 rating.

Categories of flight test / Aircraft	Category 1	Category 2
CS25; CS23 jets and CS23 Commuters	Condition 1	Condition 2
Other CS23	Condition 2	Condition 2
CS27	Condition 1	Condition 2
CS29	Condition 1	Condition 2

a. Category 1 flight tests include the following:

1. Development

2. Showing compliance with regulations or certification specifications for

a. initial flights of a new type of aircraft or of an aircraft of which flight or piloting characteristics have been significantly modified;

b. flights to investigate novel or unusual aircraft design features or techniques;

c. flights to determine or expand the flight envelope;

d. flights to determine the specified performances, flight characteristics and handling qualities in extreme conditions.

3.

(b) Category 2 flight tests include the following:
(1) Showing compliance with regulations or certification specifications for
a. Flights done in the part of the flight envelope that has already been opened and
comprising maneuvers during which it is not envisaged to encounter flight or handling characteristics significantly different from those already known;
b. Flights conducted for the purpose of determining whether there is reasonable assurance that the aircraft and its parts and appliances are reliable and function properly.
c. flying aircraft meeting the applicable airworthiness requirements before conformity to the environmental requirements has been found;
(2) market survey ~~Display flights and demonstration flights of a non type certificated aircraft;~~
(3) exhibition and airshow.

Justification:

A. Conditions for FTP should be regulated in Part 21 and not in Part FCL. Certification should regulate what kind of experience is required for FTP. Part-FCL should include the qualifications and trainings requirements.

B. Scope of Cat 1 and 2 should be in line with the scope for the issuance of a permit to fly (21A.701 of (EC) 375/2007)

response *Noted*

Appendix XII include now a reference to FCL.700 for category 1 and 2
The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary category 2 and category 4.
Concerning other manufacturers' flights they will be the subject of further regulations including tasks RMT.0348 (OPS.073). Maintenance check flights will be discussed under task RMT.0393/.0394 that started already and it will finish 2014-2015.

Point 2 of the justification is not fully understood because flight testing is only one of the reasons to issue a permit to fly.

comment *74* comment by: *EADS CASA*

Appendix XII paragraph (c)
Appendix XII paragraph (c) Requires pilots (pilot and co pilot) involved in Cat .1 and 2 flights to comply with the training requirements of Part FCL.

The proposal made by AECMA in 1998 limited the new training requirements to the pilot in command for experimental flights.
See previous comments to FCL.820

Appendix XII Paragraph (c) (2)
Appendix XII Paragraph (C) (2) set up requirements for Qualifications/competences for flight test engineers (all flights) and pilots engaged in category 3 and 4 flights.
The NPA should reflect the AECMA proposal that alternatively to the completion of approved course for the Flight Test Engineers, a DOA organisation could propose equivalent procedures for the training of flight test engineers. These procedures shall be referred to in the DOA handbook and or in the FTOM, and subject of approval by the authority.
With respect to the content of the course the comments provided to the AMC to FCL.820 are applicable as appropriate.
In addition, the Article 2f of the Regulation (EC) 1702/2003 must be modified to allow the personnel currently performing the FTE role is allowed not only to continue in their current task but to evolve or change task without requiring additional external training.

response

Noted

First comment:
See Commission Regulation (EU) 1178/2011.

Second comment accepted:
The new text will only request flight experience for lead flight test engineers.

Grand-father rule: not accepted
Changing the scope of activities will require compliance to Appendix XII.

comment

75 comment by: *Austro Control*

Item 5, Appendix XII:
Renumber c) (2) to c)(3).

1. **Item 5, Appendix XII (a):**

   (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 **except ELA aircraft**, CS-25, CS-27 or CS-29.
   Other CS-23, ELA concept is not taken into consideration in the concept.
2. **Item 5, Appendix XII:**

   Appendix XII or AMC to 21A.139, 243, 21A.14(b), 21.A.112B and 21.A.432(b) should include minimum guidance with regard to competence and experience of flight test crew for ELA products (including CS-23 ELA)

Flight Crew Requirements for Flight Test of ELA Products:

Flight Test Pilots and Flight Test Engineer conducting category 1 & 2 Flight Tests on European light Aircraft must have gained sufficient training in-house or at a training organisation appropriate to the intended aircraft and category of flight. The content of the training should include as a minimum the following:

-
  - Aerodynamics

- Flight Mechanics
- Engine characteristics and operation as appropriate
- Flight Test Instrumentation
- Regulations as appropriate
- Systems
- Human Factors
- Test Techniques
- Safety assessment

Additional requirements for FTP of Category 1 and 2 Flight Tests:

- Hold at least a Pilot licence in the appropriate aircraft category (leisure pilot licence, private pilot licence and sailplane pilot licence) as appropriate.
- Acrobatic rating, IR rating if required for certification (e.g. Aircraft certifies for IFR)
- The Test pilot must have gained sufficient flight test training to conduct flight Tests of Category 1 & 2

Additional requirements for FTE of Category 1 and 2 Flight Tests:

- Medical fitness for the intended Flight Tests
- Sufficient hands on training to get a principle understanding of Aircraft characteristics and handling qualities.

Flight tests of Category 3 and 4:
FTP and FTE should have gained sufficient training (theoretical and practical) to conduct the intended Flight Test, additionally the FTP must hold the appropriate Pilot Licence for the Aircraft being tested.

response

Noted

First comment accepted.

Second comment not accepted:
Introduction of ELA in appendix XII will be done at a later stage when we have gained experience. The comment will be taken into account at that time.

comment

89 comment by: *Diamond Aircraft Ind. GmbH*

Appendix XII (c) (1)

From our point of view the table from AMC to FCL.820 is missing in Appendix XII to understand the correlation between category of flight and required condition of test pilot.

response

Partially accepted

A table has been introduced in Appendix XII.

comment

90 comment by: *Walter Gessky*

Item 5, Appendix XII:
Change the text:
Add a new Appendix XII, Competence and experience of flight test ***crew*** ~~engineers and of pilots~~ engaged in ~~categories 3 and 4 of~~ flight testing
Justification:
The appendix is effective for the flight test crew. Under c.1are the requirements for Category 1 and 2 FTP regulated (reference to Part-FCL). For other FT crew members (category 3 and 4 and flight test engineers) the requirements are regulated in detail in the Appendix.

response

Accepted

Title has been changed to better reflect the contents.

comment

91 comment by: *Walter Gessky*

Item 5, Appendix XII:
Add the following after c) (1)
(2) Conduct of flight tests
Pilots should only be involved in category 1 and 2 flight tests when the hold the proper Part-FCL condition 1 or 2 rating.

Categories of flight test Aircraft	Category 1	Category 2
CS25; CS23 jets and CS23 Commuters	Condition 1	Condition 2
Other CS23	Condition 2	Condition 2
CS27	Condition 1	Condition 2
CS29	Condition 1	Condition 2

- (a) Category 1 flight tests include the following:
- (1) Development
- (2) Showing compliance with regulations or certification specifications for
- a. initial flights of a new type of aircraft or of an aircraft of which flight or piloting characteristics have been significantly modified;
- b. flights to investigate novel or unusual aircraft design features or techniques;

- c. flights to determine or expand the flight envelope;
- d. flights to determine the specified performances, flight characteristics and handling qualities in extreme conditions.

(b) Category 2 flight tests include the following:
(1) Showing compliance with regulations or certification specifications for
a. Flights done in the part of the flight envelope that has already been opened and
comprising maneuvers during which it is not envisaged to encounter flight or handling characteristics significantly different from those already known;
b. Flights conducted for the purpose of determining whether there is reasonable assurance that the aircraft and its parts and appliances are reliable and function properly.
c. flying aircraft meeting the applicable airworthiness requirements before conformity to the environmental requirements has been found;
(2) market survey~~ Display flights and demonstration flights of a non type certificated aircraft;~~
(3) exhibition and airshow.

Justification:

- A. Conditions for FTP should be regulated in Part 21 and not in Part FCL. Certification should regulate what kind of experience is required for FTP. Part-FCL should include the qualifications and trainings requirements.
- B. Scope of Cat 1 and 2 should be in line with the scope for the issuance of a permit to fly (21A.701 of (EC) 375/2007)

response *Noted*

Please see reply to comment 73.

comment *92* comment by: *Walter Gessky*

Item 5, Appendix XII:
Renumber c) (2) to c)(3).
Justification:
Due to insertion of new text.

response *Noted*

Not necessary as the text is not changed.

comment *93* comment by: *Walter Gessky*

1. Item 5, Appendix XII (a):
(a) General:
Change the following:
This Appendix contains the qualifications of flight crew involved in the conduct of flight tests for aircraft certified in accordance with CS-23 **except ELA aircraft**, CS-25, CS-27 **and** CS-29.
Other CS-23, ELA concept is not taken into consideration in the concept.

response *Noted*

Please see reply to comment 75.

comment 94 comment by: *Walter Gessky*

Add to (c)(2)
New requirements for
Flight Crew Requirements for Flight Test of ELA Products:
Flight Test Pilots and Flight Test Engineer conducting category 1 & 2 Flight Tests on European Light Aircraft must have gained sufficient training in-house or at a training organisation appropriate to the intended aircraft and category of flight. The content of the training should include as a minimum the following:

-
    - Aerodynamics
    - Flight Mechanics
    - Engine characteristics and operation as appropriate
    - Flight Test Instrumentation
    - Regulations as appropriate
    - Systems
    - Human Factors
    - Test Techniques

- o Safety assessment

Additional requirements for FTP of Category 1 and 2 Flight Tests:

- Hold at least a Pilot licence in the appropriate aircraft category as appropriate.
- Acrobatic rating, IR rating if required for certification (e.g. Aircraft to be certified for IFR)
- The Test pilot must have gained sufficient flight test training to conduct flight Tests of Category 1 & 2

Additional requirements for FTE of Category 1 and 2 Flight Tests:

- Medical fitness for the intended Flight Tests
- Sufficient hands on training to get a principle understanding of Aircraft characteristics and handling qualities.

Flight tests of Category 3 and 4:
FTP and FTE should have gained sufficient training (theoretical and practical) to conduct the intended Flight Test, additionally the FTP must hold the appropriate Pilot Licence for the Aircraft being tested.

Justification:
For consitent application of the rule, the mininimum competence and experience has also to be regulated for flight test crews for ELA products. Otherwise each applicant would proposed FT crew with individual established competence and experience requirements.

response *Noted*

Please see reply to comment 75.

comment *117* comment by: *Luftfahrt-Bundesamt*

Add new Appendix XII to Part-21:

All appendices currently available in Part-21 are dedicated to detail the EASA forms. Refer to the lead-in sentence in Part 21. Changing the table of contents from "EASA forms" to "Appendices" would introduce a new quality in writing Part-21. This is not supported. There is no justification that this is appropriate to the spirit of Part-21, therefore the new material should be implemented in a way consistent with the existing Part-21 philosophy.

It is considered overly prescriptive to specify the flight crew competence and experience details within the requirements' part of Part-21. The proposed regulatory level is considered inappropriate when compared to other areas in Part-21 dealing with qualification of personnel. (Example: Certifying staff qualification and training requirements are found in AMC No 1 to 21A.145 (d)(1)). Instead, formulating the flight crew competence and experience as an AMC to the related paragraph 21A.243 (a) would be sufficient and would offer more room for the flexibility needed in this business. Only the basic safety objective i.e., to ensure that flight testing shall be done by suitably qualified personnel, should be located in Part-21. AMC No 1 to 21A.243 (a), data requirements for the DOA handbook, item 6 already asks for "A description of the human resources, facilities and equipment, which constitutes the means for design, and where appropriate, for ground and flight testing". This AMC No 1 to 21A.243 (a) is considered the appropriate regulatory level and place to specify flight test crew competence and experience.
(b)(1) Category One:
- The definition of Category One Flight Test includes an „and/or" which should be avoided. It must be clear whether one or both of the listed conditions must be met in order to satisfy the definition. It is suggested to put "or".
- The term "piloting characteristics" should be explained in comparison with the term "flight characteristics and handling qualities" which is also used. It is suggested to delete the words "flight and/or piloting".
- The term "extreme conditions" should be explained to make it usable. Is flying outside the intended certificate limits "extreme"? Is a VMCA test "extreme"? Is a WAT limited take-off "extreme"?
- The use of the term "novel or unusual aircraft design feature" could be interpreted as being linked to 21A.16B (a)(1), Special Conditions, using the same words. This would be technically not appropriate and should not be implied. In fact, this flight test category applies as long as unknown areas in the aircraft characteristics are being explored in flight. It is suggested to specify "...investigate unknown aircraft features or unusual techniques".

(b)(2) Category Two:
The definition of Category Two Flight Test includes an „and/or" which should be avoided. It must be clear whether one or both of the listed conditions must be met in order to satisfy the definition. It is suggested to put "or".

(b)(4) Category Four:
- The definition of Category Four Flight Test includes an „and/or" which should be avoided. It must be clear whether one or both of the listed conditions must be met in order to satisfy the definition. It is suggested to put "neither an assessment of the behaviour of the aircraft nor the impact on the crew procedures...". It is also suggested to delete "new" from "new and not yet approved design change". The fact of not yet being approved should govern the

decision. See also comment on the associated GM.

(c) Competence and experience of flight crews:
- It is noted that this paragraph does not differentiate between pilot and co-pilot in a multi-pilot aircraft cockpit e.g., in a typical transport aircraft. Therefore, both pilots would have to meet the same competence and experience requirements.
- For CAT 4 tests, the requirements for having been appointed and having been informed of the change would apply to all categories of flight tests and do not constitute a level of qualification or experience. Rather, these two elements would be best placed in the company's flight test operations manual.

response *Noted*

First comment relative to appendix XII: not accepted.
Please see reply to comment 113.

Second comment: noted
The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary Category 2 and Category 4.

Third comment partially accepted:

Appendix XII puts different requirements on both pilot in command and co-pilot. Additional information could be seen in the Commission Regulation (EU) 1178/2011.

comment *123* comment by: *ECA- European Cockpit Association*

Add 4 word to Appendix XII, paragraph c) 2):

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

Notwithstanding the specific requirements for categories 3 and 4 of the flight tests, ECA is from the opinion that the minimum initial basic pilot knowledge required for the specific training for flight testing must be based on the CPL. Any other lower license will not assure the theoretical and flying competencies required for the safety completion of any further training.

Furthermore in many European countries pilots authorised to perform such flights must undergo specific and recognised training schools.

response *Accepted*

Text will be modified.

comment *124* comment by: *ECA- European Cockpit Association*

Add 6 words to the 3rd sentence of Appendix XII § (c) (2) : A flight test engineer must be suitably qualified **as "technical flight crew"** and, if his/her tasks include flying, medically fit, for the tasks performed, in accordance with **European and** national regulations.

Test Engineers would be part of the "technical crew." NPA 17 has provisions on this area. EASA must define the specific requirements for this type of crew member. It is not advisable to have national divergences, therefore, national regulations would have to cease to exist when NPA 17 is adopted.

response *Partially accepted*

Appendix XII is now reflecting the intent of the comment. Definition of lead flight test engineer was introduced:
Lead flight test engineer designates a flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities.

Competence and experience of LFTE have been defined. EU Regulation will supersede national regulations if any.

comment *128* comment by: *Franz Redak*

5(b)(2) First bullet: We believe that the wording used is applicable to both category 2, 3 and 4 and should be reworded to: "...(performance and flying qualities) may differ from those already known." to make a clear distinction to Category 1 but also from category (3).

5(b)(3) In 24(b)ii you mention: "...EGPWS and TCAS ....warrant higher than category 4". I cannot see that this is somehow addressed in the definition of Category Three (We would concur on this classification) Flight Tests. However, the category Four definition would clearly address the EGPWS and TCAS flight Testing: a) A EGPWS / TCAS flight test is a ne not yet approved design change, b) It does not affect the general behaviour of the aircraft and c) It will not impact on the crew procedures when the system is operating unless it is the first of an equipment Flight testing.

It should be noted that certain TCAS flight tests involve only flying against a ghost target (ground based system creating a target) This is a widely used procedure. In such case a Category 3 testing is not justified.

It is further to note that on TAWS flight testing represents an increased hazard only if the flight test includes certain Mode 2 - Excessive Terrain Closure and the so called "Look Ahead" flight tests. In most other cases the flight test could be completed by an experienced pilot. Since a large number of flight tests today include only changes to an already approved installation, this fact should be somehow addressed in the requirement.

response *Noted*

The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary Category 2 and Category 4.

comment *130* comment by: *Franz Redak*

Table to CAT 3 Flight crew members for CS23Jet/Comm/25: How is it anticipated to show experience when such flight tests have been conducted in

the past?

Table to CAT 3 - Flight Crew (Pilots) for CS23Jet/Comm/25: "...significant amount of experience..." It is important to realise that pilots may not come accross more than just one flight test for a certain system on a single aircraft type/model and due to the limitation in OPS to have only two current types endorsed this might limit the possibility to have such pilots qualified.
It is also important to note that in Business Jet and GA environment this is becoming an even more complex issue because of various other limitations as competing companies would not allow their pilots fly other aircrafts etc. Also the model variety is much higher than in the commercial airline aviation! More responsibility on the DOA (with sufficient guidance by the agency) and their procedure would be more efficient than general statements in here.

Table to CAT 3 - flight crew for CS23Jet/Comm/25: We assume that the competence and experience in CAT 3 must be in addition to the related experience listed in CAT 4. For example ...have been appointed, ...have been informed must be shown in addition to CAT 3 requirements.

Table to CAT 3/4 - flight crew for CS23Jet/Comm/25: Please clarify if "Flight Crew members" include the flight test engineer! Reason: the last bullet specifies: In the case of pilots, hold..!

response *Noted*

First comment: Noted.
It is up to the applicant to present relevant evidence such as attestation from a former employer, log book, etc.

Second comment: Accepted.
Participation to 5 flights is now required and defines the amount of experience. Please note that no type rating is required because of the reference to FCL.700 that allows the use of special authorisations.

Third comment : Accepted.
The FTOM will define the crew composition.

4th comment: Accepted.
The table has been re-organised.

comment *139* comment by: *Rob van den Bosch*

Both category 2 and 4 flight tests are related to non-approved aircraft configurations. Since a clear differentiation is currently not provided in the NPA, this differentiation should be clearly understood before defining the requirements for the flight crew.

It is TAEs understanding, that e.g. installing a different engine or propeller in an already certified aircraft type is not covered under category 4 flight test, since this modification may affect handling and flight characteristics. Therefore all development/ engineering flight tests for type investigation would be classified as category 2 flight test. Especially for small companies that develop STCs, thus usually not significantly modifying the aircraft or its systems, category 2 flight test requiring the proposed flight crew training and qualification may create a significant financial burden.

TAE proposed that engineering and demonstration flights (usually category 2) may be classified as category 4, or performed by a flight crew meeting the qualification requirement of category 4 flight test, under the following conditions:

- the aircraft configuration is sufficiently tested, flight characteristics and handling qualities within the opened flight envelope known and considered safe, and
- reasonable assurance has been shown that the aircraft, its parts and appliances are reliable and function properly, and
- adequate limitations are defined under the Permit to Fly, agreed with the PCM or under DO privilege

response *Noted*

The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary Category 2 and Category 4.
Further manufacturers' flights will be handled by future rulemaking activities including in particular task RMT.0348/.0349 (OPS.073) 'Flights related to design and production activity'.
RMT.0393/.0394 (MDM.097) 'Maintenance Check Flights' has started already and is planned to be finalized 2014-2015.

comment *140* comment by: *Rob van den Bosch*

The "other CS-23" aircraft include by definition aircraft types ranging from simple light single reciprocating engine aircraft (eg. Robin DR400 MTOW 900 kg) up to high performance twin turboprop-engine aircraft (e.g. Beech 200, MTOW 12500 lbs).
To avoid creating an undue burden on small organisations an additional category should be created for aircraft not exceeding 2000 kg MTOW. For this aircraft category alleviated flight crew qualification requirements should be defined.
For pilot qualification TAE will make proposal in response to NPA 2008-17b.

response *Accepted*

Aeroplanes below 2 000 kg have been excluded from appendix XII and CS-23 high performance aeroplanes have been now put together with CS-25 aeroplanes.

comment *153* comment by: *LHT DO*

(c) (2)

Please write more clearly that Cat 3 and Cat 4 require just a regular trained pilot holding a licence for the aircraft type with no further requirements.

It is not clearly understood whether a flight test engineer is required for Cat 3 and 4 flight tests, since the table does not include flight test engineers for these categories.

response *Noted*

The review group has performed a thorough review of these definitions and has

developed extensive guidance material in particular to clarify the boundary Category 2 and Category 4.

comment

158 comment by: *Italian Air Force Test Center*

No qualification is established for flight crew involved in CS 22, VLA, VLR flight Testing activity. Italian Air Force Test Center does not consider acceptable that experimental flight test or testing for showing compliance with the Certification Specification are carried out, for these classes of aircraft, by pilots and flight test engineers without qualification, competence and training adequate to the scope.

response

Not accepted

These aircraft have been excluded from Appendix XII. This will allow gathering experience before starting a new rulemaking task to incorporate them in Part-21.

comment

159 comment by: *Italian Air Force Test Center*

(b) (1) in the definition of Category One flights reference is made to "extreme" conditions. The definition of extreme conditions may be matter of discussion with the applicant and therefore a revision of the definition is recommended.

response

Noted

The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary Category 2 and Category 4.

comment

160 comment by: *Italian Air Force Test Center*

(b)(4) Category Four flights are characterized by the assumption that there is "*no need of the assessment of the general behaviour of the aircraft*". Such definition appears to be too generic and not so different from Category Two flights(Category Two flights are allowed within already opened approved envelope) so that some overlapping between the two categories can not be excluded.
Italian Air Force Test Center opinion is that Category Four flights should be those dedicated to the investigation of minor changes or changes that do not affect aerodynamic characteristics of the aircraft. Moreover, in the explanatory note at Para. 24.2 (b) (4) it is reported that *"in the case of pilots, hold the relevant type or class rating issued in accordance with Part-FCL"* which should allow the use of commercial or airline pilots to perform the duties foreseen for Category Four testing. If the intention is to restrict these type of operations only to minor testing, a type or class rating could not be required for the evaluating pilot if he/she is only performing the evaluation within the scope of the limited minor design change (see wording reported in explanatory note 24.2 (b) (4) (ii)), as long as he/she is familiar with the system/device which needs to be evaluated and as long as a safety pilot proficient on the evaluating vehicle will be present on board. It is also evident in the explanatory note 24.2 (b) (4) (ii) that the intention to cover different items which appear to be simple testing, such as Electromagnetic Interferences, could be highly dangerous business for pilots who are not qualified as experimental test pilots, no matter how experienced they could be in the evaluating aircraft (for example, E.I. testing on aircraft equipped with fly by wire flight controls, FADEC, and several other

	critical avionic items). Due to these considerations, some of the tests reported in the explanatory note 24.2 (b) (4) (ii) should be really considered Category 2 testing.
response	*Noted* The review group has performed a thorough review of these definitions and has developed extensive guidance material in particular to clarify the boundary Category 2 and Category 4.

comment	*161* comment by: *Italian Air Force Test Center* (c) (2) In recognizing the military and civil training organisations providing suitable training required to qualify flight test production personnel, a full list of these approved organizations should be reported in the document, as well the indication of which are the five recognized Experimental Test Pilot Schools endorsed to provide training for Category 1 and 2 testing.
response	*Noted* There is no obligation to train in an approved school for Category 3, therefore no such list will be produced. Concerning training for Category 1 and 2, schools will need to be approved and there will be no grandfathering rights.

comment	*162* comment by: *Italian Air Force Test Center* (c) (2) The requirement to "*have been informed of the change to type design for which the flight tests are to be undertaken*" is not clear in the scope and prone to hazardous conclusions from less experienced crew/companies.
response	*Not accepted* Clarifications have been brought to the definition of Category 4 flight test and extensive guidance material produced. With this definition and guidance material it is felt that the proposed requirement for flight test crew performing category 4 test is proportionate to the risk.

comment	*170* comment by: *CEV. France* **CEV Comment n° 3** Amendment to Part-21 Subpart P Permit to Fly *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* Competence of engineer and pilots is defined in two different articles (FCL 820 for Cat 1 and CAT 2 for pilots and Appendix XII for the complement). It should be clearer to define competence and experience in one paragraph only, and as it is not possible to do so in § FCL 820, everything must be defined in PART 21 Appendix XII. To sum up, everything related to flight test requirements should be in PART 21, even if everything related to pilot conditions I and II should stay in FCL
response	*Partially accepted*

The title of the appendix XII has been changed to clarify it defines the qualifications for all flight test crew. For Pilots Category 1 and 2 this is done by reference to Part-FCL.

comment

171 comment by: *CEV. France*

CEV Comment n°4

5. (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.

CS22, CS VLA, CS VLR flight tests require also significant knowledge of flight test techniques and has also the same nature of risks. Even if the level of risk could be considered as not the same, the development of such categories of aircrafts should be addressed in a second step.

response

Accepted

FCL ratings will not apply for ELA aircraft (text was changed to reflect this).
The same applicability has been chosen for Part-21 based on the fact that conditions for the crew will be approved either through approving the flight conditions by the agency or through the flight test operation manual for DOA, POA and APDOA.
This was done to reflect that there were very different situations between member states and that course truly adapted for this kind of aircraft do not exist today.
This will allow to gain experience and the Agency will introduce a new rulemaking task when sufficient experience is achieved to further regulate the qualifications for ELA.

comment

172 comment by: *CEV. France*

CEV Comment n°5

5. (b) Categories of flight tests

Test flight training is not considered in CAT one or CAT two.
Training test flights must be classified at least as a CAT two test flight in order to operate in the same regulatory environment of a true test flight.

response

Accepted

Flight test training has now been introduced either in Category 1 or Category 2 depending of the test techniques being taught.

comment

173 comment by: *CEV. France*

CEV Comment n°6

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.

This sentence requests the same level of competence for pilot in command and co-pilot. Experience has shown that, even if co-pilot needs to have some flight test competence, his competence could be lower that the pilot in command. As examples:

- for CAT one flights, if pilot in command is condition one, a copilot having condition two qualification could be, in some cases, acceptable.
- for CAT two flights, if pilot in command is condition two, a copilot having condition three or four qualification or a type rating could be, in some cases, acceptable.

Therefore following proposal sum up the concept explained above

1. **Pilots in command involved in flight tests of categories 1 and 2 shall comply with the condition established in Part-FCL.**
2. **Co-pilot may have, in some cases, a condition which could be lower by one when compared with pilot in command condition.**

CEV Comment n°7

Amendment to Part-21
Subpart P Permit to Fly
(c) Competence and experience of flight crews:
(2) Competence and experience of flight test engineers and of pilots engaged into categories 3 and 4 of flight testing.

Condition 3 and 4 pilots do not have specific flight test training,; therefore, they must hold a valid class or type rating. This sentence is clearer than "hold a valid pilot license appropriate to the category of aircraft under test."
In term of flight test technique, a CAT three or four is easier to do than a CAT one or a CAT two. As a consequence, pilots having a condition one or two should be allowed to perform CAT three or four flights.
Therefore following proposal sum up the two concepts explained above
(3)A test pilot engaged as test pilot in command in categories 3 and 4 of flight testing must either:
- hold the relevant type or class rating to the aircraft under test issued in accordance with Part-FCL or
- comply with condition of CAT one or CAT two flights.

CEV Comment n°8

Amendment to Part-21
Subpart P Permit to Fly
(c) Competence and experience of flight crews:
(2)Such flight crew members must have the competence and experience specified in the table hereunder:

To be consistent with modifications defined above, that sentence must be modified:
Such flight crew members must have the competence and experience as specified in paragraph C (1), C(2), C(3) and in the table hereunder:

Final proposition for CEV comments 6, 7, 8 :

1. **Pilots in command involved in flight tests of categories 1 and 2 shall comply with the condition established in Part-FCL.**
2. **Co-pilot may have, in some cases, a condition which could be lower by one when compared with pilot in command condition.**
3. **A test pilot engaged as test pilot in command in categories 3 and 4 of flight testing must either:**

- hold of the relevant type or class rating to the aircraft under test issued in accordance with Part-FCL or
- comply with condition of CAT one or CAT two flights.

Such flight crew members must have the competence and experience as specified in paragraph C (1), C(2), C(3) and in the table hereunder:

response

Partially accepted

Comment Nr. 6: Partially accepted.
The issue has been reviewed by the review group and a distinction between Pilot in Command and co-pilot has been introduced in Part-21 and in Part-FCL.

Comment Nr. 7: Partially accepted.
The appendix XII refer now to FCL.700 which allow several possibilities: have the type rating, have a flight test rating or have a special certificate.

Comment nr 8: Not accepted.
The text for subpart P remain unchanged as all the requirements are included into the appendix XII. This is done for readability reasons of subpart-P.

comment

177 comment by: *President, Society of Experimental Test Pilots*

(c(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.

Delete (1) and (2) under " Competence and experience of flight crews". Restate section as proposed below. Add valid license requirement to all pilot testing categories for this level of testing and remove the pilot training requirements for Cat 1 and 2 testing from Part- FCL. The alternatives to the formal test pilot training shown below are modeled after US Defense Contract Management Agency (DCMA) Instruction 8210.1.

A test pilot engaged in any category of flight testing must hold a valid pilot license appropriate to the category of aircraft.
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:

Experimental/Cat 1 Testing:

Pilot graduate of the long course at one of the following Test Pilot Schools: US Air Force Test Pilot School, US Navy Test Pilot School, Empire Test Pilot

School, Ecole du Personnel Navigant d'Essais et de Reception (EPNER), National Test Pilot School, Brazilian Test Pilot School, or Indian Test Pilot School. Not less than 1,500 hours pilot-in-command time, to include 100 hours as pilot-in-command time during Cat 2 or Cat 3 tests.

Alternatively, if the pilot is not a graduate of an approved test pilot school, the following flying and educational experience must be accrued to justify credentials and be recognized as a Cat 1 test pilot: at least 2,000 hours pilot-in-command time in comparable aircraft; at least 200 hours as pilot-in-command during Cat 2 tests and 10 hours during Cat 1 tests (copilot time acceptable for the Cat 1 experience requirement).

Education requirements are as follows:

1. An undergraduate or higher degree in an aerospace related engineering or aerospace related scientific discipline plus 1 year of applicable flight test experience, or

2. An undergraduate or higher degree in any other engineering or scientific discipline plus 2 years of applicable Cat 2 flight test experience, or

3. Any non-engineering undergraduate or higher degree plus 3 years of applicable Cat 2 flight test experience, or

4. No degree. 4 years of applicable Cat 2 flight test experience.

Engineering/Cat 2, Production/Cat 3 or Other /Cat 4 Testing:

1. The pilot must be qualified in mission, type, design, and if appropriate, series of aircraft. The pilot must have not less than 1,000 hours of pilot-in-command time. In addition, for fighter-class aircraft, the pilot-in-command time must include 100 hours in the same aircraft type and design, and the pilot-in-command time for other aircraft must include 300 hours in similar aircraft types.

2. For co-pilots, the pilot must have not less than 500 hours pilot-in-command time and be qualified in mission, type design and, if appropriate, series aircraft.

Concerns: Not allowing any alternative to formal test pilot school is not practical for many aircraft manufacturers. Not specifying which formal schools are acceptable could lead to uncertainty, delays, and a lack of opportunities to obtain acceptable credentials.

Reasons: The criteria for alternative means of qualification as used under DCMA instructions have been found to be successful in practice. The list formal schools have been judged by the Society of Experimental Test Pilots to have produced qualified flight test personnel.

response

Not accepted

The requirements for flight test crew still need to be split between Part-21 and Part-FCL. The reason is that Part-FCL can only apply to pilots due to the way the Basic Regulation is written.
Experience criteria have been added in FCL for Pilots Category 1 and 2 and in Part-21 for pilots engaged in Category 3 and 4 of flight test and all FTE.
Requirements for education level have been withdrawn and a system of pre-entry assessment has been proposed in AMC to Part-FCL and Part-21. This reflects industry present practices and provides flexibility.
Existing and future flight test training organisations will need to obtain an approval. It should be noted that training in an approved organisation is only required for pilots Category 1 and 2.

comment	*178* comment by: *President, Society of Experimental Test Pilots* **(c) Competence and experience of flight crews:** Matrix of test categories verses aircraft categories. Recommend changing aircraft categories CS-25, CS-23 jets, and C-23 Commuters, for CAT 1 flight test engineer competency requirements to be the same as CAT 2 flight test engineer competency requirements. Concern: Requiring a specific approved training course as a training requirement for flight test engineers is restrictive, expensive, and represents a much less relevant and productive course of study than is a training program customized to the testing methods and goals of the responsible flight test organization. Reason: Training obtained in courses and career development activities developed in-house and administered by the test organization is directly relevant to the flight testing conducted by that flight test organization. Modifications to the training program can be made to reflect current needs or concerns of the organization, incorporated changes in testing, and can be customized to prepare the flight test engineers for a specific upcoming flight test program if needed. Also, training can be accomplished on a more flexible schedule to accommodate existing flight testing and required training simultaneously. In addition, the demands for flight test engineers for multiple programs far exceed the training capacities of the test pilot schools
response	*Noted* Comment not understood. Contrary to the pilot whose flight test rating is part of Part-FCL and as a consequence must be done in an approved training school, training course for lead flight test engineer is part of the DOA process. It is therefore under the responsibility of the DOA owner to define the correct training, having in mind that AMC will provide a syllabus which should be followed and adequacy of the training will be checked during the DOA approval.

comment	*179* comment by: *President, Society of Experimental Test Pilots* **(c) Competence and experience of flight crews:** Same matrix, under CAT 3 and CAT 4, change the requirement to" – participated in all flights on a least five aircraft up to the issuance of their individual certificate of airworthiness" from a flight crew member requirement to a pilot only requirement. Concern: The above requirement as written applies to flight crew members in general and not to pilots specifically. The requirement as currently written extends this requirement to large airplanes. Reason: During flight tests of large airplanes which have already been granted a production certificate, the experience gained by a flight test engineer on tests that lead to issuance of an airplane's individual certificate of airworthiness is minimal. Generally, flight test engineer participation is not required in the production flight test process unless a flight test is required for a new installation or modification to the type certificate, which would change the definition of this particular testing from category 3 to category 4. However,

	flight test experience during the production process for pilots is valuable, beneficial towards the pilot's overall experience and training and specifically improves their ability to proceed towards Cat 2 or Cat 1 testing.
response	*Noted* Comment not understood The Agency agrees on the commentator remarks about the valuable experience provided by CAT 3 and 4 flight tests for CAT1/CAT2 test pilot. Regarding flight test engineer, it is up to the industry to define if a 'lead flight test engineer' is necessary or not for any flight including obviously CAT3/CAT4 flight tests. The FTOM should describe the organisation's policy for the composition of the crew including the need or not to use a lead/ flight test engineer.

comment	*180* comment by: *President, Society of Experimental Test Pilots* **(c) Competence and experience of flight crews:** For CS-23 Aircraft include under CAT 1 and CAT 2 pilot requirements that allow for a shorter version of the formal test pilot training that is required for CS-25 aircraft. Concern: An approximately one year long formal test pilot school may be in excess of what is required for small, less complicated aircraft flight test. That combined with the cost of the course and the time away from productive employment could make the long course prohibitively expensive. Reason: For years many of the countries within Europe have been successful with a shortened version of formal test pilot training (25 flight hours, 9 to 16 weeks long) that focuses on subsonic performance and flying qualities of light aircraft (under 2,000 kg)..
response	*Accepted* Flight tests on light aircrafts (under 2 000 kg) are not regulated by the Appendix XII.

comment	*190* comment by: *UK CAA* **Commentor:** UK CAA **Page:** 18 **Paragraph:** B. II. 5 (c) Appendix II Competence and experience of flight crews. **Comment:** Approving flight test courses To establish good test pilot standards across Europe, it is agreed that EASA should approve (civil) flight test qualification courses and recognise the graduates of these courses as approved test pilots. However, these proposals do not contain the means by which flight testing qualification courses are to be approved by the Agency. It also appears to have been arbitrarily decided that the five existing flight test

training organisations are all suitable training organisations, yet this does not account for the fact that the majority of them are run by the military, to syllabi tailored to their own requirements for military aircraft certification. They do not teach civil flight testing aspects on their graduate courses. Consequently, an important part of test pilot training today is the military-to-civil conversion aspects. This is largely covered by appropriate on-the-job experience rather than by running further training courses. These proposals need to recognise this aspect of the training process.

Justification: Self-explanatory.

response *Noted*

See Commission Regulation (EU) 1178/2011.

comment *191* comment by: *UK CAA*

Commentor: UK CAA
Page: 18
Paragraph: B II 5 (c) Appendix II Competence and experience of flight crews

Comment:
For category 1 and 2 flight testing, the NPA proposes that pilots have to undergo training in specific categories of aircraft, but there are no proposals (in this or any of the other relevant NPAs) for:

- minimum levels of professional experience to be gained after qualification, or
- the possibility of credit to be given for experience gained in lieu of formal training.

As mentioned in a previous comment, the vast majority of existing flight test training schools are run by the military to military-orientated curricula. Practical experience has shown that graduates from these courses need to undergo a further period of training in the civilian environment before they can be considered to be fully suitable for civil certification tasks. It is suggested that this aspect needs to be covered by these proposals.

Justification: Self-explanatory.

response *Noted*

See Commission Regulation (EU) 1178/2011.

comment *206* comment by: *ETPS CI*

B. Draft Opinion; II. Amendments to Part-21; Addition of new Appendix XII
Such flight crew members must have the competence and experience specified in the table hereunder:

CAT 2 FTEs in all Aircraft Categories and CAT 1 FTEs in "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.

Comment 5. Part – FCL requires pilots to complete a specific course for these

categories of flight test. The FTE's role is no less important and the Appendix should therefore require that FTEs engaged in these categories of work should also undertake a specific course.

response *Noted*

The Agency and the flight test group including industry and school reviewed the Appendix. The Agency shares the idea that the lead flight test engineer role is paramount in flight test. It was therefore decided, that, if a lead flight test engineer has been defined necessary in the FTOM crew policy, then Lead flight test engineer has to follow a syllabus which is comparable to the test pilot' one.

comment *207* comment by: *ETPS CI*

Comment 6. Specific courses mentioned in the table at sub-para (c) here should be defined in the same way as ETPS Comment 3 to NPA 17 made by me separately

response *Noted*

The Agency and the flight test group including industry and school reviewed the Appendix. Syllabus of the courses have been defined and accepted by the group. See the proposal for more details.

comment *210* comment by: *SPANAIR*

C. PROPOSALS

Spanair proposals to the NPA 2008-20:

1.- CLASSIFICATION OF TECHNICAL TEST FLIGHTS

To open a new classification - Technical Test Flights - or modify the existing Class 3 / 4, regulating the activities of operators using flight testing as a means of compliance with the manufacturers' procedures and aviation authorities' regulations regarding aircraft, engines, systems and equipment.

To clearly identify this type of test flights, the proposed definition is TECHNICAL TEST FLIGHTS as defined by the manufacturers.

DEFINITION OF TECHNICAL TEST FLIGHTS

Test Flights carried out to check that, after specific maintenance checks and / or heavy repairs in the aircraft structure or in aircraft systems, equipments and engines, the aircraft performs according to the airworthiness standards defined by the respective manufacturers and Aviation Authorities.

These include:

- Heavy Maintenance Checks
- Operational Test Flights

- Multiple engine changes
- Multiple flight control changes
- Aircraft out of trim limits
- Fault corrections
- Repairs / modifications on redundant systems
- Renewal of Certification of Airworthiness
- Heavy structure repairs
- Aircraft vibrations

Ferry Flights with restricted airworthiness capability in speed, altitudes or configuration (Flaps, landing gear,) are also included.

response

Not accepted

The flights as described in the Appendix XII are the only flights which are under the scope of that Appendix. Other types of flights are therefore not subject to that appendix.

However, the Agency shares the concern of the commentator regarding the flights described and has a regulatory task (RMT.0393/.0394 (MDM.097)) to work on that difficult subject.

comment *215* comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
Title of Appendix XII to Part-21, Competence and experience of flight test engineers and of pilots engaged in categories 3 and 4 of flight testing

PROPOSED CHANGE:

Appendix XII – Competence and experience ~~of flight test engineers and~~ of pilots engaged in categories 3 and 4 of flight testing*, and of flight test engineers*

JUSTIFICATION:
.
The title, as proposed in the NPA, may lead to understand that, with regard to flight test engineers, Appendix XII only relates to those engaged in categories 3 and 4. The title should clearly show that the Appendix relates to flight test engineers engaged in any category of flight testing.

response

Accepted

The Appendix XII title was misleading and has been changed.

In addition, competence and experience of pilots and lead flight tests engineers paragraph was rewritten and addressed now the competence level of pilot and engineer for every category, even when the competence level and privilege for pilots Category 1 and 2 are also defined in Part FCL.

comment *216* comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
Appendix XII to Part-21, paragraph (a)

PROPOSED CHANGE:

(a) General:
This Appendix contains the *conditions for* qualification~~s~~ 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.

JUSTIFICATION:

· Editorial

response *Noted*

Please see answer of comment 215.

comment *217* comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
Appendix XII to Part-21, paragraph (b)

PROPOSED CHANGE:

(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.
- *- Training flights aimed at acquiring a flight test rating.*

(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.~~
  - *- does not require specific flight test skills;*
  - *- does not need an assessment of the general behaviour of the aircraft;*
  - *- does not change significantly he crew procedures; and*
  - *- does not need an assessment of the crew procedures when the new or modified system is operating.*

JUSTIFICATION:

- Need to add training flights for flight test rating into Category 2
- Clarification of the conditions to classify a flight into Category 4

response *Accepted*

Definitions of the categories of flight have been deeply reviewed by EASA and the flight test group. Those comments have been taken into account.

comment *218* comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
Appendix XII to Part-21, paragraph (c)

PROPOSED CHANGE:

Replace paragraph (c) and the table by the following text:

(c) Competence and experience of flight crews:

A Flight Test Engineer (FTE) is a crew member who acts as a test conductor during the test flight and/or participates in the operation of the aircraft and its systems.

(1) Pilots engaged, as pilot in command, in flight tests of categories 1 and 2 shall comply with the conditions established in Part-FCL.

(2) Flight test engineers flying in test flights of categories 1 and 2 must be suitably trained, qualified and be medically fit for the task. The lead flight test engineer in test flights of categories 1 and 2 must hold a Flight Test Engineer certificate in the respective category.
Those certificates shall be granted after having satisfactorily completed a specific training course, which is accepted by the Agency. The certificate shall be issued by the approved training organisation, which has delivered the training.
Flight test engineers holding a certificate for categories 1 or 2 have

the privilege to act as lead Flight Test Engineers in test flights of categories 3 and 4.

(3) A test pilot engaged as pilot in command in flight tests of categories 3 and 4 must hold a valid pilot licence appropriate to the category of aircraft under test issued in accordance with Part-FCL or a flight test rating appropriate to the intended aircraft, issued in accordance with FCL.820.
The lead flight test engineer in flight tests of categories 3 and 4 must be suitably qualified and medically fit for the tasks performed, in accordance with national regulations.
The pilot in command in flight tests of categories 3 and 4 and the lead flight test engineer must have the competence and experience specified hereafter:
- Category 3: Have participated in all flights on at least five aircraft enabling the issuance of their individual certificate of airworthiness;
- Category 4: Have been informed on the change to Type Design for which the flight tests is to be undertaken

JUSTIFICATION:

· Paragraph restructured in order to establish two different sets of requirements for Cat 1-2 FTE and Cat 3-4 FTE respectively.
· Elements in removed table transferred partly into new text, and partly into AMC.

response

Partially accepted

The Agency and the flight test group including industry and schools reviewed in depth the appendix XII.

Definition of the lead flight test engineer has been introduced:

'Lead flight test engineer designates s a flight test engineer assigned for duties in an aircraft for the purpose of conducting flight test or assisting the pilot in the operation of the aircraft and its systems during flight test activities'.

Competence levels for pilots and lead flight test engineers have been also reviewed. For more details please see the proposals.

comment

219 comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
Appendix XII to Part-21

PROPOSED CHANGE:

Add a new paragraph (d) and a new paragraph (e):

(d) Flight test instructors
Flight test instructors shall be pilots and engineers, qualified for Category 1 or 2 test flights, and appointed by their organization in accordance with the Flight Test Organization Manual.

(e) Currency of flight test qualifications
The currency of test qualifications (rating or certificate) is prorogated if the flight test crew member has logged a minimum of 10 hours of test flying in the last 12 months, or has performed a flight test under the supervision of a Category 1 or 2 flight test instructor.

JUSTIFICATION:

- Need to define conditions for appointing flight test instructors;
- Need to define conditions for maintaining flight test qualifications (ref Basic Regulation, Annex III, § 1.e2)

response

Partially accepted

1) It is true that flight test engineer instructor will be appointed by their organisation, flight test pilot instructor is a qualification defined into the part FCL.

The flight test qualification currency policy of the organisation should be defined into the FTOM. That currency should be ensured either through recent experience or refresher training. See the proposal for more details.

comment

232 comment by: *Boeing*

Page: 18
Subpart P- Permit to Fly;
Item 5.; Paragraph (c)
*[ALSO **Page 4, Section IV, paragraph 9]***

Proposed Subpart P text states:

"(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. …"

Boeing suggests that the following changes be made:

Delete subparagraphs (c)(1) and (c)(2), and restate the text as suggested below. Add valid license requirements to all pilot testing categories for this level of testing, and remove the pilot training requirements for Category 1 and 2 testing from Part- FCL.

A test pilot engaged in any category of flight testing must hold a valid pilot license appropriate to the category of aircraft.

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:

JUSTIFICATION: Including flight testing categories of testing to a pilot's license is not practical. Reciprocity of ICAO-recognized pilot licenses is not included in the proposed regulation. No other regulatory agency recognizes a

pilot flight testing specific license endorsement and no mechanism exists to acknowledge flight testing approval. Some flight test organizations do have specific training and operational requirements, and that training may not be transferable to another flight test organization outside of that operator. Harmonization is not practical in all cases.

response

Not accepted

It is the Agency's opinion that pilot Category 1 and 2 flight test rating is independent of specific types of aircraft. It is the reason for which the flight test rating is defined in Part FCL. In addition, the test pilot needs to have a valid CPL and IR rating.

The lead flight test engineer, when requested in the FTOM crew policy, must be suitably trained and medically fit as defined in the AMC3 to Appendix XII-Conditions for appointment of lead flight test engineers.

comment

233 comment by: *Boeing*

Page: 18
Subpart P- Permit to Fly;
Item 5.; Paragraph (c)

*[ALSO **Page 7; Section 4; paragraph 16]***

In the table under paragraph (c)(2) containing a matrix of test categories versus aircraft categories, Boeing suggests that the following changes be made:

For aircraft category *"CS-25, CS-23 jets, and C-23 Commuters,"* for Category 1 or 2 pilot competency requirements: Change experience and training for CAT 1 and CAT 2 pilots to allow Original Equipment Manufacturer (OEM) training programs as an equivalent level of approval as EASA.

JUSTIFICATION: Requiring test pilots to attend EASA "approved" schools is costly and is not necessary if current pilot training programs are already in place. This requirement may have an additional, unintentional impact to pilot hiring practices. Although it is recognized that certain test pilot schools around the world provide quality training, they do not necessarily focus on the airplanes being produced or testing conducted by the OEMs. The flight test pilot organization of an OEM can offer directed applicable training via internal training courses, simulators, and actual airplane flight testing experience with senior pilots as a basis for the training curriculum. Allowing the organization the latitude to conduct its own training also allows for the further development of less experienced test pilots. They will have the opportunity to learn the organization's flight testing procedures in a structured manner within the environment they will be operating. This methodology has proven to be very successful and provides a diverse and qualified test pilot work force. Graduates of an "approved" test pilot course still require significant training within their own organization to prepare them to conduct certain types of tests, particularly on airplanes that are specific to the OEM but were not used during their test pilot course of training.

response

Partially accepted

It is the Agency's opinion that training course should be competency based. The training programme should follow the syllabus defined by the Agency, but may be adapted taking into account the previous experience, skill and theoretical

knowledge of the students. Manufacturers training programs should be, for sure, considered as previous experience, skill and theoretical knowledge.

comment

234 comment by: *Boeing*

Page: 18
Subpart P- Permit to Fly;
Item 5.; Paragraph (c)

[ALSO ***Page 7, Section 4 , Paragraph 17]***

In the table under paragraph (c)(2) containing a matrix of test categories versus aircraft categories, Boeing suggests that the following changes be made:

For aircraft category *"CS-25, CS-23 jets, and C-23 Commuters":* Change CAT 1 flight test engineer competency requirements to be the same as CAT 2 flight test engineer competency requirements.

JUSTIFICATION: Requiring a specific approved training course as a training requirement for flight test engineers is restrictive, expensive, and represents a much less relevant and productive course of study than is a training program customized to the testing methods and goals of the responsible flight test organization.

Training obtained in courses and career development activities developed in-house and administered by the test organization are directly relevant to the flight testing conducted by that flight test organization. Modifications to the training program can be (1) made to reflect current needs or concerns of the organization, (2) incorporated as changes in testing, and (3) customized to prepare the flight test engineers for a specific upcoming flight test program, if needed. Additionally, training can be accomplished on a more flexible schedule to accommodate existing flight testing and required training simultaneously

response

Not accepted

The Agency and the flight test group including Industry and school reviewed the Appendix.

Conclusion was that there is a need for the lead flight test engineer to follow a longer training for Category 1 flight tests than for Category 2 flight tests.

However, it has to be emphasized that not all the flight test engineers must follow the syllabus as defined in the Appendix XII, but only the lead flight test engineer.

comment

235 comment by: *Boeing*

Page: 18
Subpart P- Permit to Fly;
Item 5.; Paragraph (c)

[ALSO ***Page 7, Section 4 , Paragraph 17]***
In the table under paragraph (c)(2) containing a matrix of test categories verses aircraft categories, Boeing suggests that the following changes be made:

For aircraft category *"CS-25, CS-23 jets, and C-23 Commuters":* Under CAT 3 and CAT 4, in the requirement to*" – have participated in all flights on a least five aircraft up to the issuance of their individual certificate of airworthiness,"* change this from a flight crew member requirement to a pilot-only requirement.

JUSTIFICATION: The requirement as written applies to flight crew members in general and not to pilots specifically. The requirement as currently written extends this requirement to large airplanes.
During flight tests of large airplanes that have already been granted a production certificate, the experience gained by a flight test engineer on tests that lead to issuance of an airplane's individual certificate of airworthiness is minimal. Generally, participation by the flight test engineer is not required in the production flight test process unless a flight test is required for a new installation or modification to the type certificate, which would change the definition of this particular testing from CAT 3 to CAT 4. However, flight test experience during the production process for the pilot is valuable and beneficial towards the pilot's overall experience and training.

response *Noted*

Comment is not understood.

The Agency does not want to impose a lead flight test engineer in the Category 3 flight tests as in any other category of flight test. However, if the organisation decides that there is a need for a lead flight test engineer, then the lead flight test engineer should follow a training course which should as much as possible follow the syllabus outlined in that Appendix XII.

It is therefore industry decision to have or not a lead flight test engineer on board.

comment *240* comment by: *Air France - Maintenance Quality Assurance*

Category One includes "flights to investigate novel or unusual aircraft design features or techniques"
We think this is not applicable at STC level and would like the following clarification:
"flights to investigate novel or unusual aircraft design features or techniques which require an assessment of the general behaviour of the aircraft".
Category Two includes display flights and flights to determine reliability and proper function of aircraft, parts and appliances.
We think that category Two is not appropriate for those purposes on aircraft flying with a not yet approved STC embodied.
So we would like the following clarification in Category Four:
"(4) Category Four
- Flights performed after embodiment of a new or 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 related with the safe continuation of flight and landing when the new or modified system is operating.
- Display flights and demonstration flights of an aircraft with a not yet approved design change embodied.
- Flights conducted for the purpose of determining whether there is reasonable assurance that the parts, appliances and system(s) embodied in a not yet approved design change are reliable and function properly".

response *Partially accepted*

The Agency and the flight test group including industry and flight test schools reviewed the Appendix II. The definitions of the categories of the flight tests were deeply modified and took into account most of the comments. For more details, please see the proposal.

comment

241 comment by: *Air France - Maintenance Quality Assurance*

"(4) Category Four
- Flights performed after embodiment of a new or 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 related with the safe continuation of flight and landing when the new or modified system is operating.
- Display flights and demonstration flights of an aircraft with a not yet approved design change embodied.
- Flights conducted for the purpose of determining whether there is reasonable assurance that the parts, appliances and system(s) embodied in a not yet approved design change are reliable and function properly".

response

Partially accepted

See comments above.

comment

242 comment by: *Air France - Maintenance Quality Assurance*

1/ According to the proposed text, flight crews are pilots and flight test engineers.
We consider that a flight test engineer is not mandatory in category 4 flight tests on an aircraft that is type certified with a minimum crew of 2 pilots (Nota : a CVE may be on board to watch that the test objectives are met).
2 / For the category 4 of flight tests, the proposed text requires that "Flight crew members must have been appointed by the organisation performing the flight test".
We think this is too restrictive because in the case of a Design Organisation belonging to an airline, we have in the organisation pilots able to perform category 4 flight tests, but we may not have flight test engineer. So we would be conducted to sub-contract to a flight test organisation, only the flight test engineer. Moreover, we will not need of a test engineer in the most cases (see above).

response

Noted

Comment is not understood.

The Agency does not want to impose a lead flight test engineer in any category. However, if the organisation decides that there is a need for a lead flight test engineer, then the lead flight test engineer should follow a training course which should as much as possible follow the syllabus outlined in that Appendix XII.

It is therefore Industry decision to have or not a lead flight test engineer on board.

comment

248 comment by: *KLM EASA DOA 21J.012*

5 (b) (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.

We suggest the following text:

-" *Flights performed after embodiment of a new not yet approved design change within known/established boundaries, values.*

We also suggest to use here the text as was listed under Category (2), [no additional (un)known risk]

- Flights conducted for the purpose of determining whether there is reasonable assurance that the aircraft, its parts and appliances are reliable and function properly.

[In this npa TCAS and EGPWS installations are treated as examples of category 2 flight testing. We do not disagree that initial flight testing intended to and or show full compliance with the TCAS/EGPWS MOPS would require category 2 flight testing. After the first system approval(s) for most follow-up projects, flight testing can be required to show compliance for an "integration approval". Those can be flight tested in CAT 4. Compared to the initial certification program, the cases where previously certified equipment/systems will be installed/integrated, in a slightly different/similar configuration, the flight testing requirements are less demanding(not intended to develop new certification criteria and or flight limitations). In most cases testing is limited to the verification of interfaces with no need to leave the operational approved flight envelope. In our opinion it should be possible to conduct this type of testing (for TCAS and EGPWS and certainly for (E)TSO-ed) in similar situations under category 4.)]

response

Partially accepted

The Agency and the flight test review group including Industry and flight test school reviewed the Appendix XII.

It was agreed that Category 4 flight test definition need to be redefined. Definition of Category 4 flight test is now the following:

Flights not classified as Category 1 or 2 on an aircraft of an already certified type, in case of embodiment of a not yet approved design change.

Difference between Category 2 and Category 4 flights is explained into the GM. For more details, please refer to the proposal.

comment

255 comment by: *Aviation Support GmbH*

There is missing a procedure for installations that just exceeds the scope of CAT 4 but where the requirements of CAT 2 are definitely not the adequate instrument. This could be the installation of antenna systems, small camera systems or other small systems that should be mounted outside of the aircraft.
Will there be the possibility of getting limited or single approvals for performing flight test, that would fit into the scope of CAT 2 with a test crew (CAT 3) anymore? For example if a new external mounted system differs marginal (in matters of location and / or size) from an already approved system?
An additional category or procedure for "non significant" STC approvals with lower requirements to the flight test crew in particular for non significant

	changes to CS-27 / CS-29 helicopter should be considered as for example the aerodynamic influences are normally not as significant as it would be on a fixed wing.
response	*Not accepted* The Agency and the flight test review group including industry and flight test school reviewed the AMC. It was decided that four categories of flight test were sufficient to adequately fulfil the need. In addition definition of Category 4 was changed in order to specify that Category 4 flight tests are flights on an aircraft of an already certified type, in case of an embodiment of a not yet approved design change which is not Category 1 or Category 2 flights. The classification of the flight is explained in the GM to appendix XII which was rewritten. It is explained that, after having determined if the flight is a flight test, then it is necessary to define the classification. The classification is a top down process from Category 1 to Category 2 or Category 4, having in mind that Category 3 are only the flights performed for the issuance of statement of conformity for new built aircraft.

comment	*256* comment by: *DGAC FRANCE* Amendment to Part-21 Subpart P Permit to Fly: paragraph ***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*** Competence of engineer and pilots is defined in two different articles (FCL 820 for Cat 1 and CAT 2 for pilots and Appendix XII for the complement). It should be clearer to define competence and experience in one paragraph only, and as it is not possible to do so in § FCL 820, everything must be defined in PART 21 Appendix XII.
response	*Not accepted* FCL applies only to pilots as decided in the EASA basic regulation: the split was therefore necessary for flight crew. In addition, putting the flight test training organisations together with other flight training organisations, improves consistency.

comment	*258* comment by: *DGAC FRANCE* Amendment to Part-21 Subpart P Permit to Fly : paragraph ***5. (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.*** CS22, CS VLA, CS VLR flight tests require also significant knowledge of flight test techniques and has also the same nature of risks. Even if the level of risk could be considered as not the same, the development of such categories of aircrafts should be addressed in a second step.
response	*Not accepted*

The Agency and the flight test review group including industry and flight test school reviewed the Appendix. It is the EASA opinion that in a first step paragraph (d) 'competence and experience of flight crew' will apply only for flight tests for aeroplanes having a weight above 2000 kg.

This does not mean that those activities are not regulated. The flight crew competence will be verified during the approval of DOA or the flight conditions for the permit to fly.

comment

259 comment by: *DGAC FRANCE*

Amendment to Part-21
Subpart P Permit to Fly : paragraph ***5. (b) Categories of flight tests***

Test flight training is not considered in CAT one or CAT two.

Training test flights must be classified at least as a CAT two test flight in order to operate in the same regulatory environment of a true test flight.

response

Accepted

Flight test training flights has been introduced in Category 1 or Category 2 flight tests, depending of the required flight test technique.

comment

263 comment by: *DGAC FRANCE*

Amendment to Part-21
Subpart P Permit to Fly : paragraph ***(c) (2) :***

Comments about the bold part of sentence :

> ***"****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.* ***"***

Condition 3 and 4 pilots do not have specific flight test training,; therefore, they must hold a valid class or type rating.
In term of flight test technique, a CAT three or four is easier to do than a CAT one or a CAT two. As a consequence, pilots having a condition one or two should be allowed to perform CAT three or four flights.

Therefore we propose to replace de sentence according to this :

~~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 test pilot engaged as test pilot in command in categories 3 and 4 of flight testing must either:

- hold a the relevant type or class rating to the aircraft under test issued in accordance with Part-FCL or
- comply with condition of CAT one or CAT two flights.

response

Accepted

The possibility for a pilot having a Category 1 or Category 2 flight tests rating to participate as PIC or co-pilot in Category 3 or CAT4 flight tests is introduced in FCL820 C (2) (ii).

comment	*266* comment by: *Light Aircraft Association UK* Para a). We recommend that this be reworded as follows: "(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, except those aircraft which are defined as ELA1 or ELA2." (see comment 262 for justification) Table in para c). Row "Other CS-23", column "Cat 3". We would suggest that item 2 is not achievable: firstly, the requirement to participate in ALL flights means that if just one flight is missed (which might simply be a positioning flight), then that prevents that test programme from counting; secondly, to participate in the five previous test programmes requires one to be approved, but that can't be done because one is not approved to take part (a 'chicken and egg' situation).
response	*Partially accepted* Please refer to comment 277 for more information.

comment	*270* comment by: *European Sailplane Manufacturers* Regarding the long discussed and now already introduced / proposed alleviations for small aircraft within the General Aviation sector (especially products for airsport applications) the sailplane manufacturer would propose the following wording for paragraph (a): (a) General: This Appendix contains the qualifications of flight crew involved in the conduct of flight tests for aircraft certified *(or aimed for certification)* in accordance with CS-23, CS-25, CS-27 or CS-29 e*xcluding those aircraft falling under the definition of ELA1 or ELA2 aircraft as given in Part-21 / Part-M (TBD)*. Justification: As discussed very excessive in the MDM.032 rulemaking process it seems neither needed nor adequate to burden this part of industry with more requirements which where also not existing before introduction of EASA.
response	*Accepted* Please refer to answer to comment 277.

comment	*277* comment by: *EFLEVA* EFLEVA considers that the appendix should exclude aircraft defined as ELA1 and ELA2 from these requirements. There appears to be a problem with the wording of the column headed Category 3 under the Aircraft category Other CS-23. Flight crew must have participated in all flights on at least 5 aircraft up to issue of CofA. This makes it impossible for new crews to start.
response	*Partially accepted*

Comment 1. Partially agreed. Appendix XII applies for every aircraft but paragraph (d) 'requested competence and experience of flight crews' applies only for CS-23 aircraft above 2 000 kg.

Comment 2: Not agreed: It is the Agency's intention to request that the pilot, flying a CS-23 aircraft which has a maximum weight above 2 000 kg should be exposed to those specific flights before being pilot in command. It means that they should act only as co-pilot before having flown all the flights on at least five aircrafts.

comment *282* comment by: *Southern Cross International*

The competence and experience of pilots involved in categories 3 and 4 flight test should be specified in FCL 1.820 and AMC to FCL 1.820. It is not logical to provide the requirements for one group of pilots in Part-FCL and for the other group of pilots in Part-21.

response *Noted*

FCL applies only to pilots as decided in the EASA basic regulation: the split was therefore necessary for flight crew. In addition, putting the flight test training organisations together with other flight training organisations improve consistency.

comment *286* comment by: *Hélicoptères Guimbal*

Comment on NPA N° 2008-20 Flight testing by Hélicoptères Guimbal

Context

Hélicoptères Guimbal (HG), created in September 2000, was granted its Design Organization Approval and obtained the CS-27 type certificate for the Cabri G2 helicopter on December 2007.
It was granted its Production Organization Approval in the first semester of 2008 and delivered the first aircraft last September.
During these eight years of activity, HG carried out flight testing of the Cabri G2, including development and complete CS-27 certification flight programme.
As it was the first new general aviation company in 30 years in France developing the first new two seat piston engine CS-27 helicopter in 30 years, it faced a demanding flight testing regulation, adapted over the years for heavier turbine helicopter mostly aiming at public transportation.
This evolution was in unison with the shift of the CS-27 regulation to transport helicopter standards, without any distinction for the up-to-then almost inexistent small piston engine helicopter category, unlike what is done for CS-23 aircraft.
Even if the level of complexity of a helicopter is higher than that of an airplane, HG considers that the gap between the two ends of CS-27 category justifies a distinction.
- The lower end is a 600 kg two-seat piston engine helicopter with no hydraulics and simple avionics.
- The higher end is a 3000 kg 7-seat twin turbine engine helicopter with dual hydraulics, automatic pilot and high level avionics.

The simplicity of the lower end of the CS-27 impacts notably flight testing management.
Experience acquired during 300 hours of development and certification flight

tests carried out on Cabri G2 prototype, in French flight categories A and B, enabled to confirm the fact that flight tests can be carried out with a high level of safety by a single test pilot assisted with the inboard and display, and prepared through a detailed briefing of the test to be performed by the technical staff.
The reception flights carried out on the first serial Cabri G2s showed that it can also be managed, with a high level of safety, by a single pilot.

On that basis, it is reasonable to consider that the qualification requirement of the flying technical crew (second seat) can be highly reduced compared to demanding CS-27 helicopters.
This was confirmed by the four experienced test pilots having participated in the Cabri G2 flight test program.

Proposition :

On that basis, for CS-23 and CS-27 aircraft tests that can be carried out by a single pilot, HG would like to propose the possibility for an engineer to participate to the flight with the pilot.
The requirements could be for the engineer to :
- have been appointed by the organization performing the flight test; and
- have passed the theoretical knowledge examination (FCL.725) of the relevant type or class rating issued in accordance with Part-FCL; and
- have participated in a detailed briefing of the flight test to be performed.

Note : As the legal basis for the test engineer is to be found in the section "Qualification of the crew" of Part 21 flight conditions regulation, the choice could be done relatively to each particular flight condition.

response

Noted

It is up to the DOA holder to decide if a lead flight test engineer is necessary on board. If a DOA holder decides that a LFTE is necessary on board then paragraph (d) of the Appendix applies and mandatory training has to be given. It should be noticed that if the DOA holder elects not to use a LFTE but other flight test engineer, then it is up to the DOA holder to define and give training commensurate to the task assigned to those flight test engineers. It has to be noticed also that it is not the Agency's intention to mandate any FTE on board. The crew composition is under the responsibility of the DOA holder.

comment

288 comment by: *Hélicoptères Guimbal*

HG would like to point out that proposed category 4 flight tests are of the same kind of what is usually mentioned in chapter 8 of some more complex (than piston engine powered) CS-27 Rotorcraft Flight Manuals. These flight manuals describe tests to be carried out after replacement of several components or modules (Engine, MGB, TGB, Avionics) and give corresponding test sheets. These tests can be carried out by a private pilot qualified on the type. Since they do not form part of normal operation, they are usually carried out under the operator's responsibility. This system is widely applied with a good level of safety.
Experience of that kind of test carried out by experimental test pilots and professional pilots confirmed the relevance of that way of working on Cabri G2.
HG would like to make sure that the requirements described for pilots for category 4 CS-27 helicopters flight tests (appointed by the organisation, informed of the changes, hold the relevant type rating) were meant in that way

and that a private pilot licence with the standard type rating will be considered valid.

response *Not accepted*

The requirement to hold a CPL was to ensure minimum level of knowledge and experience.

comment *289* comment by: *Hélicoptères Guimbal*

Usually, helicopter design organisations distinguish ground runs from flights and allow specific personnel that does not have a pilot license to carry them out when test pilot skills are not needed. How does this NPA take into account this usual practice? How will the mention to ground runs be considered in the operators manual?

response *Noted*

That NPA is related to flight test engineer and flight test pilot only. It is not the intention of the Agency to cover ground people on the Appendix XII.

However, it is the Agency's opinion that the possibility, for helicopter design organisations to allow specific non piloting persons to do ground test, could be explained under the DOA process. The Agency could check during the DOA approval process if those specific procedures are adequate or not.

comment *295* comment by: *ATR*

4/ DRAFT OPINION, Amendments to Part 21, Subpart P, §5.(b)(2)
Display Flights and demonstration flights of a type-certificated aircraft are not considered as Flight tests. Therefore, flight crew, for those flights, will have to comply to Part FCL. For ATR, some demonstration flights are performed, on a type-certificated aircraft, by the flight test organization. In addition to the pilot invited (potential customer), the flight crew is composed of a flight test pilot acting as captain and a pilot with ATR type rating. This is in conformity with French regulation "arrêté du 24 Juillet 1991 relatif aux conditions d'utilisation des aeronefs civils en aviation générale" (§ 4.3.2.2). Such specificity doesn't appear in this NPA and we request it to be considered when EASA will propose the operational regulation related to non-commercial flights. For this future regulation, it should also be considered that for any flight, other than flight tests, performed by a Flight Test Organisation, on a type certificated aircraft (including check flights and ferry flights), the crew can be composed of flight test pilots.

response *Noted*

See Commission Regulation (EU) 1178/2011.

comment *296* comment by: *ATR*

5/ DRAFT OPINION, Amendments to Part 21, Subpart P, § 5.(b)(3)
Flight tests category 3 are considered as "flights performed prior to the issuance of an individual certificate of airworthiness in order to establish the conformity of the relevant aircraft production to the approved type design." . Is the first flight of a new production aircraft considered as a flight test category 3? If this first flight includes a check of GPWS correct functioning, is it then considered as a flight test category 2? Same question is raised for check flight

of in-service aircraft. If the check flight includes a check of GPWS correct functioning, does it become a test flight and moreover of category 2?

response *Noted*

It is the Agency's opinion that the Category 3 flight tests are all the flights performed for the issuance of statement of conformity for a new built aircraft.

It is therefore applicable to other flights and not only the first flight.

Check flights, if they do not require flying outside of the limitations of the TC AFM and are performed on an aircraft holding an individual certificate of airworthiness, are not flight tests.

However, flights in order to certify a new GPWS could either Category 2 or Category 4, depending of the integration of the system into the aircraft system.

comment *298* comment by: *ATR*

7/ DRAFT OPINION, Amendments to Part 21, Subpart P, §5.(c)
(1) should be read as : "**Pilots involved in flight tests of categories 1 and 2, when acting as captain, shall comply…**"
(2) should be read as : "**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 and hold the relevant type or class rating, both licence and rating being issued in accordance with Part FCL. When the flight test is performed under the authority of a DOA, the type or class rating can be replaced by a special authorisation. In addition, the test pilot acting as captain must have the competence and experience specified in the table hereunder.**

A flight test engineer must be suitably qualified and medically fit, for the tasks performed, in accordance with national regulations. In addition, the flight test engineer in charge of the flight must have the competence and experience specified in the table hereunder."

In the table, remove in column CAT 3 and CAT 4 (for all aircraft categories) the sentence "In the case of pilots, hold the relevant type or class rating issued in accordance with Part FCL".

- The requirements apply to the CAPTAIN and not to both pilots (for aircraft requiring two pilots), and/or to the FTE in charge of the flight and not to all engineer on board during the flight.
- Proposition of simplification of the table.

response *Partially accepted*

The Agency agrees on the idea to clarify the wording. The paragraph (d) of the appendix corresponding to the competence and experience of Pilots and Lead flight test engineers e were deeply reviewed in order to clarify the intend of the rules. Please the new proposal for more details.

comment *309* comment by: *Fokker Services*

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:

There are situations where flight test crew with the competence and experience mentioned above is not available. For those situations it would be desirable to have an alternative approach where the requirements are tailored to the actual situation.

With regard to the competence and experience of flight crews the question can be raised what is safer: contracting an external flight crew qualified for a certain Category flight tests just to perform one difficult test point or allow the project flight crew who is not exactly qualified for a certain Category to perform that test after being trained, educated e.g. dedicated for that specific test point. In most cases the second option would be preferable.

response

Noted

Comment is not really understood. The Agency does not intend to request FTEs on board for every flight test. It will be on DOA/POA decision. However, if DOA/POA need to have on board a lead flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities, then the particular FTE need to be trained as defined in the Appendix.

comment

324 comment by: *Society of Flight Test Engineers*

Affected Paragraph: Subpart P, Permit to Fly, Competence and Experience of Flight Crews, CAT 1 Testing

Concern from SFTE: The requirements as listed are extreme, unnecessary and will impose undue financial burden without appreciably improving flight test safety (and may have adverse effects on test safety).
"The Flight Test Engineer must have satisfactorily completed a specific training course accepted by the agency."

Justification: The NPA does not outline the requirements that constitute a "course accepted by the agency" or a training institution which provides such training. SFTE recommends that EASA establish ***FTE training guidelines and recommendations*** to be outlined in the proposed Flight Test Operations Manual.

response

Not accepted

The Agency and the flight test review group including Industry and flight test school reviewed the Appendix XII and its AMC. **It was agreed that not all the FTE, but only the Lead flight test engineer which** is 'assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities' needs to receive specific flight test training for Category 1 and Category 2 flight tests.

That training should be done under the responsibility of the DOA holder. See the AMC for the training programme guidelines.

It should be emphasised that it is the DOA holder decision to have on board or

not LFTE or FTE.

The Agency will request for Lead flight test engineer only a mandatory training, and will give in the AMC2 to Appendix XII the description of such a training.

comment

325 comment by: *Society of Flight Test Engineers*

Affected Paragraph: Subpart P, Permit to Fly, Competence and Experience of Flight Crews, CAT 2 Testing.

Concern from SFTE: The requirements as listed are vague, unnecessary and will impose undue financial burden without appreciably improving flight test safety (and may have adverse effects on test safety).

"The Flight Test Engineer must have gained a significant amount of flight test experience relevant to the task, and must have been trained for flight testing activities."

Justification: "Significant" is not defined in the NPA, training considered "relevant to the task" and "trained for flight testing activities" are not specified in the NPA. SFTE recommends that EASA establish ***FTE training guidelines and recommendations*** to be outlined in the proposed Flight Test Operations Manual. Required training will pose an undue and unnecessary burden on both Flight Test Organizations and Flight Test Engineers. The NPA as written does not provide latitude for FTE's to gain the necessary experience as they would not be permitted to participate in Category 1 or Category 2 testing without experience and/or completion of an approved course.

response

Not accepted

Please refers to comment 324.

comment

326 comment by: *Society of Flight Test Engineers*

Affected Paragraph: Subpart P, Permit to Fly, Competence and Experience of Flight Crews

Concern from SFTE: The requirements as listed for Category 3 Testing are extreme, impractical and difficult to develop.
"The Flight Test Engineer must have…participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness."

Justification: There may be misunderstanding in the content of the requirement.

A legal interpretation of "all flights" may be that an individual FTE is present and participating for ***each and every flight of five different aircraft types***. This is impractical, especially in large organizations which utilize extensive talent to share workload (e.g., one group of engineers conducts handling qualities testing, another conducts performance testing, another avionics, another subsystems, etc.) or where multiple test aircraft (and crews) are utilized to complete testing in a timely fashion. If a typical large airplane program takes 18 months and 1,500 sorties, division of labor across many disciplines and flights would make it impossible for an FTE to amass the flights (and aircraft types) to fulfill this requirement.

response

Not accepted

It is the Agency's opinion that there is a misunderstanding.

Category 3 flights are the flights performed for the issuance of the statement of conformity for a new built aircraft.

The number of flights for each new aircraft depends of the category of aircraft but is usually around 2 or 3. Request to follow all the flights of five different aircrafts would lead to do 15 flights if 3 flights is necessary by aircraft.

The reason is that experience has shown that during those production flights, unexpected failures can occur which could not be described in the AFM. It is therefore necessary to expose new crew to those events.

It also has to be mentioned **that it is up to the DOA holder to decide if a Lead flight test engineer or a flight test engineer is necessary on board or not.**

A. Explanatory Note - C. Draft Decision p. 22

comment

156 comment by: *LHT DO*

2 (b) and (f)
We suppose that the flight conditions are sufficient to cover these items for cat 4 flights.

response

Accepted

The intent was to bring administrative simplification.

comment

250 comment by: *KLM EASA DOA 21J.012*

We suggest the following change:
(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.

We suggest the following change:
(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 requirement that the flight test air crew must get the specific project-related training programme ~~s 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.
It is not clear why in the FTOM the use of proper calibrated test equipment should be addressed, while in a certification program this will be addressed/defined in the test-reports and analyses. *(for a non-TC holder it is an abnormal administrative burden to issue for every new project a revised FTOM, while the same information already will be addressed in the standard EASA approved certification program)*

response *Accepted*

Wording of the AMC has been reviewed.

For paragraphs b, c and d the FTOM should describe the organisation's processes for flight test. For more details, please refer to the proposal.

The sentence h related to the flight test installation has been deleted as this request is more linked to DOA process rather than safety of flight. This sentence was replaced by a more generic request: 'procedures to identify the instruments and equipment to be carried'.

A. Explanatory Note - C. Draft Decision - AMC to paragraphs 21A.139, 21A.243 and to 21A.14(b), 21A.112B(b) and 21A.432B(b) p. 22-23

comment *26* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

This AMC should include the possibility to make reference to a third party Flight Test Operations Manual when this activity is subcontracted (see comment to §21A.243).

response *Not accepted*

The Agency and the flight test review group including Industry and flight test school reviewed and rewrote the AMC.

The revised AMC to FTOM clarify the situation concerning contractors and sub-contractors.

Use by contractors and sub-contractors: When test flights are done by contractors or sub-contractors, they should comply with the FTOM of the main organisations, unless they have established an FTOM in compliance with Part-21.

comment *54* comment by: *Diamond Aircraft Ind. GmbH*

IS: "AMC to paragraphs 21A.139...."
SHOULD BE "AMC to paragraphs 21A.143..."

There is no change to 21A.139 planned in the NPA, but the term "significant organisation´s policies" in 21A.143 needs further explanation.

response *Accepted*

Agreed.

comment	*55* comment by: *Diamond Aircraft Ind. GmbH* (j) Definiton of production flight test programme: IS: ..."flights performed prior to issuance of an individual certificate of airworthiness..." SHOULD BE: "...issuance of statement of conformity (EASA From 52)" Justification: Issuing a certificate of airworthiness is an authority task (see Part-21 Subpart H) There is no benefit in mixing organisation tasks with authority tasks.
response	*Accepted* Definition of flight test category 3 has been reviewed to read: Flights performed for the issuance of statement of conformity for a new built aircraft which do not require flying outside of the limitations of the TC AFM.

comment	*57* comment by: *Diamond Aircraft Ind. GmbH* A common standard for European flight test operations manual would harmonize flight test operation and improve safety in the flight test environment.
response	*Accepted* The Agency thanks the commentator and totally agrees with his comment.

comment	*65* comment by: *ENAC* **AMC to 21A.139, 21A.243, 21A14(b), 21A.112B(b) and 21A.432B(b)** **(2)(d)** Transportation of technicians and passengers The reference here to passengers is inappropriate as no passengers are carried on board during flight test activities. The same comment applies to paragraph (h). A passenger is a person on board who pay a ticket for being transported. **(2)(i)** Permit to fly Under paragraph 2.(i) of the AMC, it is stated that the FTOM must include "management of changes between and during flights ". This is not consistent with par. 21A.708 and 21A.713. These Part 21 paragraphs should be modified and limits of the management of the changes should be identified.
response	*Accepted* (2) (d): the title has been changed to read: *'Carriage of persons other than crew members'.* (2) (i): that requirement is deleted.

comment	*76* comment by: *Austro Control*

1. AMC to 21A.139 § i) Permit to fly:
Add the following:

1. AMC to 21A.139 § i) Permit to fly:
Add the following:
Coordination with the NAA with regard to operating restrictions is required before issuance of a PdF?
Justification:
The organization shall include in the Flight Test Oparation Manual procedures to coordination with the NAA with regards to any restriction required where the aircraft can be operated.

2. AMC to 21A.139 § i), Flight Test aircrew

Add the following after the last sentence:
"The policy should include the a specific training programme when in house training for flight test pilots for Category 1 and 2, condition 1 and 1 intended to be done. The trainings programme should be coordinated with the Trainings Organisation which provide the initial and theoretical training for the rating to the pilot.
Justification:
In house training for candidates for the rating for flight test should be possible when

c. Regulated in the POA or DOA flight test operation manual,

d. The flight training syllabus is coordinated with a Trainings Organization

e. The theoretical training is done by an adequately approved Trainings Organization.

f. This should be possible similar to Part 145, 147 and 66.

response *Partially accepted*

Comment 1: Accepted. The wording in the proposal is the following:
The FTOM shall include:

i. A description of the organisation's processes for flight test, including the flight test organisation involvement into the permit to fly issuance process.

Comment 2*:* Not accepted.
As Category 1 and Category2 flights need to have a flight test rating apposed on the pilot licence, the corresponding training has to be taken in approved flight schools.
However, credit should be given to previous experience and training course could be shortened accordingly.

comment *95* comment by: *Walter Gessky*

AMC to 21A.139 § i) Permit to fly:
Add the following:
Coordination with the NAA with regard to operating restrictions and qualification of flight test crew is required before issuance of a PtF?
Justification:
The organization shall include in the Flight Test Oparation Manual procedures to coordination with the NAA with regards to any restriction required where the aircraft can be operated.

response *Accepted*

The wording in the proposal is the following:

The FTOM shall include:

i. A description of the organisation's processes for flight test, including the flight test organisation involvement into the permit to fly issuance process.

comment *96* comment by: *Walter Gessky*

1. **AMC to 21A.139 § c), Flight Test aircrew**
Add the following after the last sentence:
"The policy should include the a specific training programme when in house training for flight test pilots for Category 1 and 2, condition 1 and 2 is intended to be done. In case of FTP Condition 1and 2 training, the training program should be coordinated with the Training Organization which provide the initial and theoretical training for the rating to the pilot.

Justification:
In house training for candidates for the rating for flight test should be possible when

- a. Regulated in the POA or DOA flight test operation manual,
- b. The flight training syllabus is coordinated with a Trainings Organization The theoretical training is done by an adequately approved Trainings Organization. This should be possible similar to Part 145, 147 and 66.

response *Noted*

See Commission Regulation (EU) 1178/2011.

comment *118* comment by: *Luftfahrt-Bundesamt*

C. Draft Decision:

AMC to 21A.139, 21A.143, 21A.243, 21A.14(b), 21A.112(B)(b), 21A.432(B)(b):

Subparagraph (a): Instead of saying that the co-ordination between departments affecting FT has to be „mentioned" in the FTOM, the AMC should rather require that the organisation should have these processes and procedures in place. In particular, the Design Organisation should specify within the FTOM their process for categorisation of their flight test activities.

Subparagraph (c): The term "fight test air crew" should be replaced by the term "flight crew" or "flight crew for test flights" which is used elsewhere. Also, for an AMC the term "must" is generally not appropriate. It is suggested to use "should".

Subparagraph (d): There may be groups other than technicians and passengers. A specific group are the Authority flight test crews. It is suggested to use: „... policy for on-board presence of persons other than the minimum crew defined under 1.2."

Subparagraph (e): On top of the description of the specific instrumentation, appropriate procedures e.g. for calibration and configuration control for test articles should be implemented.

Subparagraph (h): Instead of requiring that the „FTOM should list" a number of documents, the AMC should rather require to specify in the FTOM the purpose and scope of each of the documents and, more important, the process of how the organisation works with these documents. The control of any test article is also an important task: Hardware and software status tracking, weight tracking, recording of deficiencies and management of their resolution, individual flight clearance process etc. are crucial to safe and successful testing.

response *Partially accepted*

The Agency and the flight test review group including Industry and flight test school reviewed the AMC

Subparagraph (a): The paragraph has been reviewed in the sense requested by the commentator. For more details, see the proposal.

Subparagraph (c): The title has been changed to read: 'crew member'.

Subparagraph (d): The title has been changed to read: 'Carriage of persons other than crew members'.

Subparagraph (e): Reference to specific instrumentation has been deleted as it is more a DOA process rather than a safety issue.

Subparagraph Documents: Sentence is now more general as it has been changed to read: the FTOM should list the documents to be produced for flight testing, and include or refer to the procedures related to their issue, update and follow-up.

comment *131* comment by: *Franz Redak*

We would point out that for CAT 4 flight tests little more than a classification of Flight test (unless specifically defined in a list) and a general statement about the qualification of the flight test engineer is necessary. Reducing the burden on small DOA´s would improve efficiency and not increase the entry barrier. Also consider that EASA is involved in the approval of the conditions for flight and as per 21A.708 (a) to (h) will have to verify these items separately. While as (i) should already be part of a DOM and (j) and (k) are not applicable for such a DOM performing CAT 4 flight tests.

to (b) We assume a more or less exhaustive but representative number of examples and the classification of the flight test would be an acceptable standard once agreed. For any other flight testing not included in this list, a

	FHA should be then performed.
response	*Partially accepted* FTOM has been reviewed. The different paragraphs now just request the organisation's policy. As a consequence, the less complex the flight test operations are, the shorter are the corresponding paragraphs.

comment	*132* comment by: *Franz Redak* We believe that for a small DOA (ADOA) performing flight tests after ELT, COM, NAV, GPS etc. installations (assuming CAT 4) little more than a procedure how to qualify the flight test engineers is necessary. For all other issues EASA has already the means to interfere (see below). An additional procedure would be undue burden to such organisation. For example: As per 21A.708 the DOA must provide all this data during the application for a conditions for flight anyway. (a) to (h) is therefore covered and verified by EASA thru the 21A.708 obligations at the application for a condition for flight, while (i) should be already implemented into the DOM and (j) and (k) is most probably not an issue for such organisation. We believe that also CAT 3 flight tests can be done without an extensive separate procedureby just using the means of the approval of the Conditons for flight or thru the means of a privilege i.a.w. 21A.263(c)(6) and (7). (e) The prior definition of flight test instrumentation will be not feasible for certain "on-demand" STC providers (ADOA, DOA). We propose a wording change to: "The FTOM should describe the responsibility and decision making on the use of specific instrumentation...." (e) We believe that the data processing is NOT an issue for the FTOM but an integrated part of the DOA - STC process and therfore does not have to be specified in the FTOM.
response	*Accepted* The Agency and the flight test review group including industry and flight test school reviewed the AMC. Paragraph 1 and Paragraph 2: FTOM should describe the organisation's policy for crew competency and currency. That policy must obviously depends of the foreseen operation. Paragraph 3 and 4: Agreed. Any reference to flight instrumentation and data processing has been suppressed.

comment	*133* comment by: *Franz Redak* (h)(i) Flight order: Please specify!
response	*Accepted* The list of the paragraphs which have to be included in the flight order is defined. For more details, please see the proposal.

comment	*134* comment by: *Franz Redak*

	(h)(i) "Listing of the tests to be performed...." is ususally a part of the flight test programme and therefore does not belong to the "flight order"
response	*Accepted* Wording has been reviewed and changed to read: The FTOM should list the documents to be produced for flight testing and include or refer to the procedures related to their issue, update and follow-up.

comment	*144* comment by: *CAA CZ* AMC to 21A.139 We recommend to add to paragraph (2) an obligation to obtain an approval to carry out flight test from an aerodrome owner/operator. This approval should in our opinion prevent possible disputes between aeroplane operators and aerodrome owners/operators.
response	*Noted* The comment is not understood. It is the Agency's opinion that flight test operations should be conducted in a way which is consistent with air traffic control.

comment	*155* comment by: *LHT DO* 2. (b) and (f) Formal Hazard Assessment / Safety Equipment: We consider that the formal hazard assessment is covered by the definition of the flight conditions for cat 4 flights. Please confirm and note in the text.
response	*Not accepted* It is the Agency's opinion that risk and safety management as defined in paragraph 2(b) is a process which describes the organisation's policy relative to risk and safety for every flight test activity. That organisation's policy should include in general wording how to do for Category 4 flights.

comment	*163* comment by: *Italian Air Force Test Center* (2) (g) Weather minima As a general rule, all flight tests should be performed in VMC/VFR conditions, although IM/IFR conditions could be accepted for some avionic testing not involved in the safe conduction of the test vehicle (for example, radar testing, TCAS, ecc.).
response	*Noted* Operational procedures have been removed of the FTOM as the national flight test operations will remain applicable until the tasks RMT.0348/.0349 (operational requirements for flights related to design and production activity) are completed.

comment	*174* comment by: *CEV. France* CEV Comment N°9 *AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b)*

Flight Test Operations Manual (FTOM)

2.(c) Flight test air crew:
The policy should include- the specific project-related training programmes required for the various categories of flights

Flight test competence, for pilots and for flight test engineers as well, is much related to the amount of activity. Defining a minimal activity and the procedure of "renewal" in case of activity lower than the defined limit should be necessary.
Proposal:
The policy should include:
- the specific project-related training programmes required for the various categories of flights
- the minimal annual flight test hours and, if necessary, the procedure to renew the flight test qualification.

response

Accepted

The Agency and the flight test review group including industry and flight test school reviewed that paragraph. As the commentator, the Agency also believes that flight test competence is related to the amount of activity.

The following wording was included in the AMC:

> The FTOM should describe how training for flight test is organised.
>
> Currency of the flight crew may be ensured either through recent experience or refresher training.
>
> Sufficient flight experience by year should be at least:
>
> - For test pilot, 50 hours, including 20 flight test hours;
> - For lead flight test engineer, 10 flight test hours.
>
> In case of insufficient annual flight experience, flight crew members need to undergo refresher training, in accordance with a syllabus included in the FTOM.

comment

181 comment by: *President, Society of Experimental Test Pilots*

c. Draft Decision

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

Add the following reference to equivalent documentation:

AMC to paragraphs 21A.139, 21A.243, and to 21A.14 (b), 21A.112B (b) and 21A.432B (b)
Flight Test Operations Manual (FTOM) *or Equivalent Documents*

1. The FTOM... or it may be a separate manual or *equivalent individual documents* referred to in those documents, as appropriate.

2. The FTOM *or equivalent* should *include* the elements listed in (a) to (k):

Concern: Requirement for a dedicated Flight Test Operations Document when the information prescribed for inclusion in the FTOM may already be available in other company documents.

Reason: Open the requirement for a flight test organization to provide a FTOM to include equivalent documentation not necessarily contained in a single manual. Required information contained in other sources may already be available for reference. A dedicated document is not always necessary.

response

Not accepted

It is the Agency's opinion that FTOM is mandatory. However, that document could be a separate manual or included in the DOA/APDOA/POA documents.

comment

211 comment by: *SPANAIR*

2.- FLIGHT TEST DOCUMENTATION

Approved by the respective Aviation Authorities, the manufacturers shall provide the operators with the pertinent documentation – test protocols, methods, procedures, limitations – to perform the TECHNICAL TEST FLIGHTS.

response

Partially accepted

The wording has been reviewed.

It is the Agency's opinion that the FTOM should list the documents to be produced for flight testing. See the proposal for more details.

comment

220 comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
Title of AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b)

PROPOSED CHANGE:

Change the title of the AMC as follows:

AMC to 21A.139, *21A.143,* 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b)
Flight Test Operations Manual (FTOM)

JUSTIFICATION:

· The NPA proposes a new subparagraph 13 in Part 21 paragraph 21A.143 (production organisation exposition). This needs to be referred to in the AMC on FTOM.

response

Accepted

Modification will be introduced.

comment 221 comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

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

PROPOSED CHANGE:

(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.

JUSTIFICATION:

· It is easier and more logical to define those cases where a formal hazard assessment is necessary.

response *Partially accepted*

The Agency and the flight test review group reviewed the wording. The proposed wording has been changed to read:

The FTOM should describe the organisation's policy in relation to risk and safety assessment, mitigation and associated methodologies.

comment 222 comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b), paragraph (c)

PROPOSED CHANGE:

(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 *organisation's* policy *and programme for the training of its flight crew members* should ~~*include*~~ *be described, including* the specific project-related training programmes required for the various categories of flights. *A current list of appointed flight test crew members should be maintained, and included or referenced in the FTOM.*

JUSTIFICATION:

· More accurate wording.
· Need to identify authorised flight test crew members.

response

Partially accepted

That paragraph has been reviewed:

The composition, the organisation's policy for competency and currency should be described as well as the appointment of all the crew members. A flight time limitation policy should be established. See the proposal for more details.

comment

223 comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b), paragraph (e)

PROPOSED CHANGE:

(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*~~ *or refer to the procedures by which the organisation ensures that:*

- *The instrumentation required for a flight is installed, calibrated, and properly used for the specific purposes of the flight;*
- *The test data are properly transmitted or reported as necessary for further processing.*

JUSTIFICATION:

· The FTOM cannot describe details of instrumentation used for various types of flights and of data processing means. It should describe how the organisation ensures that the instrumentation and data are available and used as needed.

response

Partially accepted

The wording has been modified to read that that the FTOM should list, depending on the nature of the flight, the specific safety related instruments and equipment that should be available on the aircraft or carried by people on board.

The FTOM should contain provisions to allow flights to take place in case of defective or missing instruments or equipment.

comment

224 comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b), paragraph (f)

PROPOSED CHANGE:

(f) Safety Equipment:

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

JUSTIFICATION:

· Editorial

response

Partially accepted

The complete paragraph has been rewritten and instruments an equipment were addressed in a more generic wording.

The FTOM should list, depending on the nature of the flight, the specific safety related instruments and equipment that should be available on the aircraft or carried by people on board.

The FTOM should contain provisions to allow flights to take place in case of defective or missing instruments or equipment.

comment *225* comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b), paragraph (h)

PROPOSED CHANGE:

(h) Documents:
The FTOM should list the documents to be produced for flight testing*, and include or refer to the procedures related to their issue, update and follow-up:*

(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

JUSTIFICATION:

· The way of producing and using the documents should be indicated.
· The notion of "General Flight Test Programme" is unclear, and, for the purpose of aircraft certification, redundant with the certification plan.

response

Accepted

The text has been modified as suggested.

comment *226* comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b), paragraph (i)

PROPOSED CHANGE:

(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.*~~

JUSTIFICATION:

The last two sentences are relevant to Subpart P and should not be located in the AMC on FTOM, where it is sufficient to refer to the organisation's procedures for implementation of Subpart P.

response

Partially accepted

That paragraph was reviewed by the Agency and the flight test group.

The rule relative to the FTOM has been developed and a general statement has been introduced in order to ask for a description of the organisation's processes for flight test, including how the necessary coordination for flight test and for the approval of flight conditions and issue of permit to fly is ensured.

comment

227 comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b), paragraph (j)

PROPOSED CHANGE:

Delete paragraph (j):

~~*(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).*~~

JUSTIFICATION:

~~———~~The proposed paragraph (j) is relevant to Subpart P and should not be

located in the AMC on FTOM, where it is sufficient to refer to the organisation's procedures for implementation of Subpart P (first sentence of paragraph (i)).

response

Accepted

The Agency and the flight test review group including industry and flight test schools reviewed the FTOM content. The paragraph has been deleted.

comment

228 comment by: *Airbus*

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b), paragraph (k)

PROPOSED CHANGE:

(~~*k*~~ *j*) Demonstration*, training and air show* flights:
The FTOM should include the ~~*procedure to*~~ *organisation policies for the* conduct *of flights for the purpose of* demonstration*, training and air show* ~~*flights*~~ with aircraft flying under a permit to fly *or under a certificate of airworthiness*.

JUSTIFICATION:

- Paragraph renumbering due to proposed deletion of paragraph above.
- Need to extend the scope of the paragraph

response

Accepted

Please see response to comment 227.

comment

236 comment by: *Boeing*

Page: 22
Section C. Draft Decision;

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

Boeing suggests adding references to equivalent documentation in the proposed text as follows:

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

Flight Test Operations Manual (FTOM) ***or Equivalent Documents.***

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* ***or equivalent individual documents*** *referred to in those documents, as appropriate.*

2. *The FTOM* ***or equivalent*** *should* ~~*contain*~~ ***include*** *the elements*

listed in (a) to (k): …"

JUSTIFICATION: The proposed NPA would require a dedicated Flight Test Operations Document, although the information prescribed for inclusion in the FTOM may already be available in other company documents.

We request that EASA open the requirement for a flight test organization to provide a FTOM to include equivalent documentation not necessarily contained in a single manual. Required information contained in other sources may already be available for reference. A dedicated document is not always necessary.

response *Not accepted*

It is the Agency's opinion that FTOM is mandatory. However, that document could be a separate manual or included in the DOA/APDOA/POA documents.

comment *249* comment by: *KLM EASA DOA 21J.012*

AMC to 21A.139, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b)
Flight Test Operations Manual (FTOM)
-
-
-
We suggest the following change:
(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.

We suggest the following change:
(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 requirement that the flight test air crew must get the specific project-related training programme ~~s 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.
It is not clear why in the FTOM the use of proper calibrated test equipment should be addressed, while in a certification program this will be addressed/defined in the test-reports and analyses. *(for a non-TC holder it is an abnormal administrative burden to issue for every new project a revised FTOM, while the same information already will be addressed in the standard EASA approved certification program)*

response

Partially accepted

The Agency and the flight test review group including industry and flight test schools reviewed the FTOM content.

The paragraphs (b), (c), (d) have been modified. See proposal for more details.

The paragraph (e) is related to safety instrumentation and not to design activities. The paragraph has been reviewed and specifies now that FTOM should list*, 'depending of the nature of the flight, the specific safety related instrumentation and equipment that must be available on the aircraft or carried by people on board*'.

comment

264 comment by: *DGAC FRANCE*

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

Paragraph 2.(c): last following sentence :

> *"The policy should include- the specific project-related training programmes required for the various categories of flights"*

Flight test competence, for pilots and for flight test engineers as well, is much related to the amount of activity. Defining a minimal activity and the procedure of "renewal" in case of activity lower than the defined limit should be necessary.

Therefore we propose the following modification :

~~The policy should include- the specific project-related training programmes required for the various categories of flights~~
The policy should include:
- the specific project-related training programmes required for the various categories of flights
- the minimal annual flight test hours and, if necessary, the procedure to renew the flight test qualification.

response

Accepted

The corresponding paragraph was modified to include:

The FTOM should describe how training for flight test is organised.
Currency of the flight crew may be ensured either through recent experience or refresher training.

Sufficient flight experience by year should be at least:
- For test pilot, 50 hours, including 20 flight test hours;
- For lead flight test engineer, 10 flight test hours.

In case of insufficient annual flight experience, flight crew members need to undergo refresher training, in accordance with a syllabus included in the FTOM.

comment

280 comment by: *Rolls-Royce plc [DGJ]*

If it the intention for these requirements to regulate the safety of flight test operations [see comment 279], then the relevance of "the procedure for data processing within the organisation" in para 2.(e) "Flight test instrumentation

	and data processing" is not obvious. At first reading, this text appears to relate to Design activities rather than Flight Test activities (ie it imposes controls on the use of test data from an experimental vehicle, which should already be covered as part of a Design organisation's approval). If there are aspects of flight test safety which are enhanced by this AMC (eg should this be referring to "on-board, real-time processing of safety instrumentation"?), these should be clarified in the proposed text; otherwise, the para is ambiguous.
response	*Accepted* That paragraph is related to safety instrumentation and not to design activities. The paragraph has been reviewed by EASA and flight test review group and specifies now that FTOM should list*, 'depending of the nature of the flight, the specific safety related instrumentation and equipment that must be available on the aircraft or carried by people on boar*d'.

comment	*299* comment by: *ATR* 8/ DRAFT DECISION Modify title : "**AMC to 21A.143**" (instead of 139). - typing error
response	*Accepted* Agreed.

comment	*300* comment by: *ATR* 9/ DRAFT DECISION, AMC to 21A.143, 21A.243 ... 2.(b) Provide more details about the formal hazard assessment. What is the objective and what is expected in terms of substantiation?
response	*Partially accepted* The text has been changed to read a policy for risk and safety management. The idea was to anticipate on the expected introduction by ICAO and EASA of SMS requirements for DOA and POA. There are best practices in existence. An AMC could be developed to provide more details if necessary.

comment	*310* comment by: *Fokker Services* (i) Documents Associated with a Flight Test Programme - General Flight Test Programme - Flight Order (or equivalent) 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 **Justification: not all companies will have a "Flight Order".**
response	*Not accepted*

The 'or equivalent' was discussed within the flight test review group. It was considered that whatever is the name of the document, it is the content of the document which is important.

A. Explanatory Note - C. Draft Decision - GM to Appendix XII p. 23-24

comment *5* comment by: *Jet Avionics*

GM to Appendix XII to Part-21

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

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. follow on design change, 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.

Justification:
To better clarify the difference between category 2 and 4 flight tests, it is important to distinguish between the initial intallation and the follow on installation. The first one requires more extensive flight tests and the second one less extensive flight tests. Therfore if the change is a follow on installation flight test engineers and test pilots can be classified as category 4 due to the fact that the follow on design change should demonstrate that the installation in the aircraft has not been affected.

response *Accepted*

The Agency and the flight test review group including industry and flight test schools reviewed the category of flights and rewrote the GM.

Definitions of Category 2 and Category 4 flight tests have been totally rewritten and clearer examples are given in the GM to better understand difference between the two categories. Difference between initial installation and follow on installation could be taken into account. For more details, please read the new proposal.

comment *9* comment by: *Embraer - Indústria Brasileira de Aeronáutica - S.A.*

Paragraph 24.1
The Brazilian Air Force Test Pilot School has also a international standing and/ or recognition as proven by almost 22 years of strong relationship with USAF and USNavy Test Pilots Schools, EPNER, ETPS and, more recently with SETP and SFTE.

Paragraph 24.2.c
Despite of requirements being only applicable to EU manufacturers, due to the globalized aspect of aviation and the significant costs for training a flight test crew, a foreign flight test license validation process should be planned and defined for those flight test crew who already posses such type of license issued by another country.

response

Noted

See Commission Regulation (EU) 1178/2011.

comment

12 ❖ comment by: *Pilatus*

A.1 Introduction

Pilatus Aircraft Ltd. have reviewed EASA Notice of Proposed Amendment (NPA) No. 2008-17b and NPA No. 2008-20 and recognises the value in attempting to establish guidelines for flight test operations and to standardise the qualifications and experience of flight test crews. Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process very similar to that proposed by the NPA. However, Pilatus considers that the proposed regulation does not give sufficient credit for taking a balanced approach to the qualifications and experience of flight test crews operating in an existing safe and proven environment. Namely, to use highly qualified and experienced supervisors to monitor the activities of personnel with considerable type and role experience. It is the assertion of this company that the proposed amendments will not, in all cases, have the effect of improving standards of practice in flight test, but indeed could have the opposite effect as outlined below. In addition this proposal may have a significant adverse effect on the proven and successful flight test activities currently conducted.

A.2 Categories of Flight Test

Categorising flight test into 4 broad categories is something that most personnel engaged in this vocation would agree upon, but difficulties emerge when attempting to place every type of flight test conducted at Pilatus Aircraft Ltd. into one or other of these categories. For example, specialised avionics test flights, which require pilots with appropriate military or civil experience, would in future need to be carried out by test crews with new qualifications but who may lack the appropriate role experience. That is why Pilatus Aircraft Ltd. believes that it is more appropriate to follow a balanced, supervisory approach where experience in the role and on type provides a more efficient and safe solution.

A.3 Categories of Aircraft/Engine Type

The NPA splits CS-23 aircraft into categories, to permit a structured approach to crew competence levels depending on the complexity of the aircraft to be tested. While this is considered a practical approach, the reason for placing CS-23 jet aircraft in a higher category than CS-23 turboprop aircraft (which can be more complex than turbojets/turbofans both mechanically and in terms of their effects on aircraft handling and performance) is not clear. There is no precedent in current test pilot training schools to suggest that testing of a jet-powered aircraft requires any greater qualification or training than testing of a turbo-prop powered aircraft. This differentiation would seem unreasonable, resulting in unnecessary restrictions for those testing jet-powered aircraft. It is suggested that a better split would be between single- and multi-engine aircraft (of whatever engine type) due to the additional testing required for multi-engine aircraft. This would better fit with paragraph 17 of the NPA, which states: "The competences and experience depend on 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.4 Flight Test Aircrew Training and Experience

This company has a proven track record of producing and certifying high quality

aircraft, and has done so employing many individuals without the formal qualifications proposed in this NPA. Mandating such qualifications across the board, however, would prevent many members of the Pilatus flight test team from continuing their work, and will have considerable detrimental effects on the company's ability to conduct a high proportion of future flight tests.

It is considered that attendance of a "specific course" should not be the only acceptable means of satisfying the training and experience requirements for flight test crews. Introduction of the proposed amendment could result in individuals with the required formal qualification but far less experience on type replacing individuals with less qualification but significantly more experience on type. This would not necessarily represent an improvement in standards of flight test and safety, but could indeed represent the opposite.

Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process. The process is continuously audited and strictly supervised by a Head of Flight Test (FTE) with 25 years flight test experience and a Chief Experimental Test Pilot with all the qualifications required by the NPA. Therefore a suitable supervisory system is utilised with individuals of considerable experience and qualifications supervising the flight test process, as well as ongoing training in flight test related skills.

Flight test personnel are selected for a given task based upon their knowledge and suitability for that task. Training is provided as required by experienced Pilatus staff, external consultants or by attending an approved training course as considered appropriate.

It is suggested that alternative training for staff engaged in all types of testing could be accepted as follows:

- Internal training given by experienced staff who have a proven track record in the industry (and who have been approved by the national authority) should be permitted.

- Experience in flight testing of similar aircraft, either within the company or from previous appointments, should be taken into consideration (including in-house training for all types of aeroplanes). It may be necessary to approve these on a case-by-case basis to ensure that the training received is appropriate to the task to be undertaken. This would also apply to any external crew brought in to carry out an assessment, and could be administered using the Permit to Fly procedure.

The test pilot or FTE must be sufficiently experienced to cope with normal and emergency situations. To cover this, flying currency in the same class of aeroplane as that to be tested, should be maintained (including recent experience of manoeuvres similar to those to be tested). Relevant training (including aeromedical, safety equipment, ejection seat and survival training) as appropriate to the aircraft to be tested should be provided and the aircrew member must be physically fit to the level required to fly in the test aeroplane. Guidelines on acceptable levels of training and timescales for currency (both flying currency and aeromedical/survival training) should be drawn up and publicised.

A.5 Specifications for test pilot school courses

Pilatus personnel have undertaken short courses at the various recognised test

pilot schools. In some cases these courses do not comply with the seemingly arbitrary requirements set by NPA-17b. In particular the requirement to fly 12 different fixed-wing types during a 15 week course seems quite unreasonable. It is reasonable to suggest that more experience on a far fewer number of aircraft similar to those under test at the test pilots company is more appropriate from an efficiency and safety point of view.

The intention of the 10 month course (required for condition 1 experimental flight test in the NPA) at these schools must also be considered. This course is offered with the intention of training government-sponsored test crews to carry out all possible future government test programmes, and as such offers significant training in such subjects as fly-by-wire flight control systems and transonic handling characteristics. Such training would clearly represent an unnecessary waste of time and money for a commercial organisation such as Pilatus Aircraft Ltd.

A.6 Conclusion
Pilatus Aircraft Ltd. flight test personnel will, at one stage or other, be involved in every type of flight test as defined in the proposed amendment. This company takes a responsible and balanced approach to its flight test personnel, as it would be prohibitively expensive to employ exclusively graduate test pilots and graduate flight test engineers from the 5 recognised schools. Pilatus believes that a balanced approach to crew experience, combined with on-the-job training, and appropriate specialised training, and defined and proven practice and process would meet the intent of the NPA and enhance flight safety with an acceptable level of investment without significant financial burden on the industry. Therefore Pilatus can not agree to the content of this NPA and specifically opposes the requirements set forth in A.3, A.4 and A.5.

response

Not accepted

A.1 Introduction:
The Agency has reviewed the comments with a review group where Industry and Flight Test Training Schools were represented. We believe that the changed text represents a minimum standard for safety. **As this standard covers a significant breadth and depth of knowledge, it will help crews moving to one aircraft to another or to approach new technologies**. A grand-father clause has been introduced to allow existing flight test crews to continue doing their job. Monitoring the flight test activities will be done using the flight test operations manual.

A.2 Categories of Flight Test:
The 4 categories are covering the vast majority of flight tests to be performed. We expect that the flight test operations manual would provide the necessary complements to cover the kind of specific flights described here.

A.3 Categories of Aircraft/Engine Type:
Agreed, the criteria of propulsion has been replaced by a criteria of performance (Speed and altitude). In that context, we felt that there was no need to further distinguish between single and twin engine aeroplanes.

A.4 Flight Test Aircrew Training and Experience:
Please see response to A1.

A.5 Specifications for test pilot school courses:
We have now established detailed syllabus in cooperation with the schools and

industry.

A.6 Conclusion:
Please see reply to A1.

comment

13 comment by: *Aerodata AG*

Another example should be used for determining the boundary between Cat. 2 and Cat 4. flight testing, since the line between those two is not seen as being well defined by a general statement like this. (see comment to **24.2.b.ii**)

It should also be noted that by the use of the hazard assessment it shall always be possible to re-classify the Category for systems, especially if the flight testing is carried out under STC work. The Flight Conditions together with the hazard assessment shall allow to judge the requirement for the flight testcategory on a case by case bases, taking all remedies intrduced by the contents of the Flight Conditions into account (e.g. test setup, test area, procedures defined, requirements for pilot qualifications, etc.).

response

Partially accepted

Comment 1 : Accepted
As the consequence of a classification is paramount, the Agency and the flight test review group including Industry and flight test schools reviewed the category of flights and have rewritten the GM.

Definitions of Category 2 and Category 4 flight tests have been totally rewritten and clearer examples are given in the GM to better understand the difference between Category 2 and Category 4 tests.

Comment 2: Not accepted
The classification of the flight test is primarily linked to consideration of special techniques and skills rather than safety assessment.
Safety assessment should be done as defined in the FTOM and the experience and competence of the flight crew could be taken as a mitigating factor to reduce the risk to an acceptable level.

comment

27 comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

The title doesn't seem to be appropriate because cases 2 and 4 are addressed in this GM and not 3 and 4.
The text "*engaged in categories 3 and 4 of flight testing*" should then be removed or modified.

response

Accepted

Title has been changed to read:

Competence and experience of pilots and lead flight test engineer.

comment

35 comment by: *ADAC Luftfahrt technik*

The proposed categorization of TCAS- and TAWS flight tests as "Category 2" is unacceptable, because this kind of equipment as well as the related test flight procedures are uncritical and as such belong to "Category 4".

Finding an experienced flight test engineer with "sufficient" experience will probably be extremely difficult on the market and, even if it can be found, not economically viable for a small DO.

Leasing or renting a flight test engineer for the flight test will, for the same reason, result in high costs and unacceptably long waiting times. Most of the flight tests concerned in the past were conducted most satisfactorily by experienced pilots and CVEs of the design organisations.

response *Not accepted*

Comment 1

The Agency and the flight test review group including industry and flight test school reviewed the Appendix XII paragraph (d) and its corresponding AMC.

It was considered that TCAS/TAWS embodiment which require to operate the aircraft in deviation of the standard operational procedure or when the system integration requests a global crew procedure assessment would necessitate a Category 2 flight test

Comment 2

The idea is not to mandate nor a lead flight test engineer neither a flight test engineer for every flight test.

The DOA holder must define the crew composition and therefore to include or not a LFTE or a FTE.

However, if a LFTE is requested on board, then needs to follow the Appendix XII requirements.

comment *77* comment by: *Austro Control*

1. **AMC to Appendix XII to Part 21:**
   a. **AMC to Appendix XII to Part-21**

Change the title:
Competence and experience of flight test **crew** ~~engineers and of pilots~~ engaged in ~~categories 3 and 4 of~~ flight testing
Justification see Draft opinion item 1

   b. **Item 1.a), second sentence:**

Add the following:
Bachelor of Science or equivalent university standards, **engineering degree or an adequate experience** are usually requested from applicants.
Justification:
Either deleted or added that other kinds of standards are equivalent.

response *Partially accepted*

Comment 1: Title will be changed to read: 'Competence and experience of test pilots for Category 3 and 4 flight tests and lead flight test engineers'.

Comment 2 : Reference to Bachelor or university standards has been deleted in the new proposal.

comment

97 comment by: *Walter Gessky*

1. AMC to Appendix XII to Part 21:
AMC to Appendix XII to Part-21
Change the title:
Competence and experience of flight test **crew** ~~engineers and of pilots~~ engaged in ~~categories 3 and 4 of~~ flight testing
Justification:
See comment to Draft opinion.

response

Accepted

Headline has been changed to read:

Competence and experience of test pilots for Category 3 and 4 flight tests and lead flight test engineer.

comment

119 comment by: *Luftfahrt-Bundesamt*

Guidance material to Appendix XII:

- Examples or interpretative material for all four categories should be provided to make the definition usable and to illustrate the boundaries.

- The examples for Category Two are not really typical for Category Two.

- The text on examples for Category Four tests raises concerns: This guidance material makes use of the term "typical airline/MRO design change". This term is considered not appropriate. An airline or maintenance-repair-overhaul organisation as such would not qualify to develop any design changes, unless they also hold a design organisation approval according to Part-21 (or alternative procedures, if appropriate). Any activity to show compliance by flight tests is beyond the scope of an airline or MRO. From the list of examples given, the intent of Category Four tests is possibly to refer to cabin related design changes that require flying the airplane but not involving subjects requiring any test pilot assessment. Additionally, it should be noted that there are more reasons to fly the changed aircraft other than to check for EMI. Proper functioning of the new elements is commonly also an objective of such flight tests. Therefore: Only if this Category Four gets limited to items not requiring any test pilot or flight test engineer assessment or judgement, then the flight crew qualification outlined in this NPA would be acceptable.

response

Accepted

The Agency and the flight test review group including industry and flight test school reviewed the Appendix XII paragraph (d) and its corresponding AMC.

As a result:

Comment 1: GM to Appendix XII has been rewritten and examples for all four

categories are provided.

Comment 2: Examples of Category 4 are given.

Comment 3: Sentence has been changed to read: 'Typical flights required by a DOA to show compliance with airworthiness requirements of "not yet approved data" after airline/MRO design changes'.

comment

135 comment by: *Franz Redak*

EGPWS should be replaced with TAWS

SAD does not concur with the classification to CAT 2 for a TAWS or TCAS flight test. We propose CAT 3. See comment in 24(b)(ii)

Headline misleading: "...pilots engaged in CAT 3 and 4 of flight testing" but in the text it is discussed CAT 2 and CAT 4!

response

Partially accepted

The Agency and the flight test review group including industry and flight test school reviewed the Appendix XII paragraph (d) and its corresponding AMC.

Comment 1: Not accepted.
Category 3 flights are only the flights performed for the issuance of statement of conformity for a new built aircraft which do not require flying outside of the limitations of the AFM.

Comment 2: Accepted.
Headline has been changed to read: 'Competence and experience of flight crew'.

comment

136 comment by: *Franz Redak*

CAT 4: The list of examples is not what you would expect in a BA and GA environment. Propose to add: GPS/FMS installations, certain TAWS flight test and TCAS flight test with ghost targets, EFIS installations, installation or replacement of COM and NAV systems including Transponders.
For most of the examples you would not even do a flight test such as ELTs.

response

Partially accepted

The Agency and the flight test review group including industry and flight test school reviewed the Appendix XII paragraph (d) and its corresponding AMC. Examples of Category 4 flight includes flights after embodiment of guidance/warning systems for which it is necessary to check the good functioning only and where there is no need to fly the aircraft outside of the Aircraft AFM limitations.

comment

141 comment by: *Rob van den Bosch*

The given examples are typical modifications to part 25 and large part 23 aircraft. Guidance for modifications to small part 23 aircraft is required.
Guidance is required regarding the classification of design change related flight tests, taking into account to type of modifications typically applied to the different aircraft categories affected by this NPA.

response

Partially accepted

The Agency and the flight test review group including industry and flight test school reviewed the Appendix XII paragraph (d) and its corresponding AMC. Examples which are given could apply no matter the size of the aircraft.

However, it should be noticed that this Appendix applies only for CS-23 aircrafts above 2 000 kg.

comment

147 comment by: *ERA*

Comment 2 - Competence of flight crew in Category Four
Proposed change:
C. Draft Decision

III. 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
(c) Flight crew members must:
- have gained a significant amount of flight experience relevant for the task; and
- For Category Three flight testing only: 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.
Rationale:

Inconsistency with table of Appendix XII (c) (2): the requirement to have participated in all flights on at least five aircraft up to the issuance of their individual CoA is only required in CAT 3 column.

response

Accepted

Appendix XII paragraph (d) and corresponding AMC has been rewritten to clarify requirements and suppress that inconsistency.

comment

204 comment by: *ETPS CI*

B. Draft Opinion; II. Amendments to Part-21; Addition of new Appendix XII
(b) Categories of flight tests

Comment 3. Flight test rating training flights are not mentioned in any category. Recommend add to "(2) Category Two:"
- "Flight test rating training flights"

response

Accepted

Flight test training for a flight test rating will be mentioned in Category 1 and Category 2 flight test definitions.

comment	*205* comment by: *ETPS CI* B. Draft Opinion; II. Amendments to Part-21; Addition of new Appendix XII *(c) Competence and experience of flight crews:* *(2) Competence and experience of flight test engineers and of pilots engaged into categories 3 and 4 of flight testing.* **Comment 4**. Creates confusion as to whether this section deals with pilots and engineers in categories 3 & 4 or engineers in all categories and only pilots in categories 3 & 4. Recommend change to: "…. pilots engaged in categories 3 and 4 and FTEs engaged in all categories of flight testing"
response	*Accepted* Title has been changed to read: 'Competence and experience of test pilots and lead flight test engineers'.

comment	*243* comment by: *Air France - Maintenance Quality Assurance* Example of category 2 flight tests may be more accurate. you should write "new types of never certified EGPWS and TCAS" instead of "EGPWS and TCAS", because we think that installation of a certified EGPWS or TCAS for a type of aircraft on an another type of aircraft may be substantiated only with category 4 flight test and not with category 2 flight test. About examples of category 4 flight tests, we understand that for such design changes, if flight tests are needed, those flight tests will be category 4. Could EASA confirm it is not the intent to mandate systematically flight tests for this kind of changes. Today the majority of cabin changes with entertainment system are EMI checked only via ground test and this is accepted by EASA PCM.
response	*Partially accepted* The Agency and the flight test review group including industry and flight test schools reviewed the category of flights and rewrote the GM. Definitions of Category 2 and Category 4 flight tests have been rewritten and clearer examples are given in the GM to better understand difference between Category 2 ad Category 4 tests. GM to Appendix XII to Part-21 includes now a specific paragraph addressing the TAWS or TCAS category of flight test classification. Regarding the second comment, examples which are given for Category 4 flight test do not mandate flight test for the corresponding modifications. The idea is to give examples of flight test if that means of compliance has been found necessary by the DOA.

comment	*251* comment by: *KLM EASA DOA 21J.012* (ii) Documentation required on board during flight testing We suggest the following change: (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.~~
(The last two sentences are relevant to Subpart P)

response *Not accepted*

The FTOM is related to flight crew issues. See FTOM proposal for further details.

comment *311* comment by: *Fokker Services*

- 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.
The examples try to clarify the boundary between Category 2 and 4 flight tests. The given examples are much too general. The TCAS example (typically a Category 2 test) is not correct in all cases. The Advisory Circular for TCAS installation allows a test with targets of opportunity for all repeat applications. This is typically a Category 4 test.
The consequence of a Category classification is rather big (especially for small companies). Therefore a more detailed guidance for distinct between Category 2 and 4 flight test is requested. It should also be possible to make the classification dependant of a safety assessment.
For the Permit to Fly also an assessment of the situations and conditions required for a safe flight is requested (ref. AMC 21A.263). The Flight Conditions of a Permit to Fly may include requirements for crew qualifications (ref. 21A.708 (b)2.).

response *Partially accepted*

As the consequence of a classification is significant, the Agency and the flight test review group including Industry and flight test schools reviewed the category of flights and rewrote the GM.

Definitions of Category 2 and Category 4 flight tests have been totally rewritten and clearer examples are given in the GM to better understand difference between Category 2 ad Category 4 tests.

It should be noted that classification of the flight test is primarily linked to consideration of special techniques and skills rather than safety assessment.

Safety assessment should be done as defined in the FTOM and the experience and competence of the Flight crew could be taken as a mitigating factor to reduce the risk to an acceptable level.

A. Explanatory Note - C. Draft Decision - AMC to Appendix XII p. 24-25

comment *12* ❖ comment by: *Pilatus*

A.1 Introduction

Pilatus Aircraft Ltd. have reviewed EASA Notice of Proposed Amendment (NPA) No. 2008-17b and NPA No. 2008-20 and recognises the value in attempting to establish guidelines for flight test operations and to standardise the qualifications and experience of flight test crews. Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process very similar to that proposed by the NPA. However, Pilatus considers that the proposed regulation does not give sufficient credit for taking a balanced approach to the qualifications and experience of flight test crews operating in an existing safe and proven environment. Namely, to use highly qualified and experienced supervisors to monitor the activities of personnel with considerable type and role experience. It is the assertion of this company that the proposed amendments will not, in all cases, have the effect of improving standards of practice in flight test, but indeed could have the opposite effect as outlined below. In addition this proposal may have a significant adverse effect on the proven and successful flight test activities currently conducted.

A.2 Categories of Flight Test

Categorising flight test into 4 broad categories is something that most personnel engaged in this vocation would agree upon, but difficulties emerge when attempting to place every type of flight test conducted at Pilatus Aircraft Ltd. into one or other of these categories. For example, specialised avionics test flights, which require pilots with appropriate military or civil experience, would in future need to be carried out by test crews with new qualifications but who may lack the appropriate role experience. That is why Pilatus Aircraft Ltd. believes that it is more appropriate to follow a balanced, supervisory approach where experience in the role and on type provides a more efficient and safe solution.

A.3 Categories of Aircraft/Engine Type

The NPA splits CS-23 aircraft into categories, to permit a structured approach to crew competence levels depending on the complexity of the aircraft to be tested. While this is considered a practical approach, the reason for placing CS-23 jet aircraft in a higher category than CS-23 turboprop aircraft (which can be more complex than turbojets/turbofans both mechanically and in terms of their effects on aircraft handling and performance) is not clear. There is no precedent in current test pilot training schools to suggest that testing of a jet-powered aircraft requires any greater qualification or training than testing of a turbo-prop powered aircraft. This differentiation would seem unreasonable, resulting in unnecessary restrictions for those testing jet-powered aircraft. It is suggested that a better split would be between single- and multi-engine aircraft (of whatever engine type) due to the additional testing required for multi-engine aircraft. This would better fit with paragraph 17 of the NPA, which states: "The competences and experience depend on 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.4 Flight Test Aircrew Training and Experience

This company has a proven track record of producing and certifying high quality aircraft, and has done so employing many individuals without the formal qualifications proposed in this NPA. Mandating such qualifications across the board, however, would prevent many members of the Pilatus flight test team from continuing their work, and will have considerable detrimental effects on the company's ability to conduct a high proportion of future flight tests.

It is considered that attendance of a "specific course" should not be the only acceptable means of satisfying the training and experience requirements for flight test crews. Introduction of the proposed amendment could result in individuals with the required formal qualification but far less experience on type replacing individuals with less qualification but significantly more experience on type. This would not necessarily represent an improvement in standards of flight test and safety, but could indeed represent the opposite.

Pilatus is an EASA approved Part 21 Subpart-J Design Organisation under which flight testing is performed in accordance with a documented process. The process is continuously audited and strictly supervised by a Head of Flight Test (FTE) with 25 years flight test experience and a Chief Experimental Test Pilot with all the qualifications required by the NPA. Therefore a suitable supervisory system is utilised with individuals of considerable experience and qualifications supervising the flight test process, as well as ongoing training in flight test related skills.

Flight test personnel are selected for a given task based upon their knowledge and suitability for that task. Training is provided as required by experienced Pilatus staff, external consultants or by attending an approved training course as considered appropriate.

It is suggested that alternative training for staff engaged in all types of testing could be accepted as follows:

- Internal training given by experienced staff who have a proven track record in the industry (and who have been approved by the national authority) should be permitted.

- Experience in flight testing of similar aircraft, either within the company or from previous appointments, should be taken into consideration (including in-house training for all types of aeroplanes). It may be necessary to approve these on a case-by-case basis to ensure that the training received is appropriate to the task to be undertaken. This would also apply to any external crew brought in to carry out an assessment, and could be administered using the Permit to Fly procedure.

The test pilot or FTE must be sufficiently experienced to cope with normal and emergency situations. To cover this, flying currency in the same class of aeroplane as that to be tested, should be maintained (including recent experience of manoeuvres similar to those to be tested). Relevant training (including aeromedical, safety equipment, ejection seat and survival training) as appropriate to the aircraft to be tested should be provided and the aircrew member must be physically fit to the level required to fly in the test aeroplane. Guidelines on acceptable levels of training and timescales for currency (both flying currency and aeromedical/survival training) should be drawn up and publicised.

A.5 Specifications for test pilot school courses

Pilatus personnel have undertaken short courses at the various recognised test pilot schools. In some cases these courses do not comply with the seemingly arbitrary requirements set by NPA-17b. In particular the requirement to fly 12 different fixed-wing types during a 15 week course seems quite unreasonable. It is reasonable to suggest that more experience on a far fewer

	number of aircraft similar to those under test at the test pilots company is more appropriate from an efficiency and safety point of view. The intention of the 10 month course (required for condition 1 experimental flight test in the NPA) at these schools must also be considered. This course is offered with the intention of training government-sponsored test crews to carry out all possible future government test programmes, and as such offers significant training in such subjects as fly-by-wire flight control systems and transonic handling characteristics. Such training would clearly represent an unnecessary waste of time and money for a commercial organisation such as Pilatus Aircraft Ltd. A.6 Conclusion Pilatus Aircraft Ltd. flight test personnel will, at one stage or other, be involved in every type of flight test as defined in the proposed amendment. This company takes a responsible and balanced approach to its flight test personnel, as it would be prohibitively expensive to employ exclusively graduate test pilots and graduate flight test engineers from the 5 recognised schools. Pilatus believes that a balanced approach to crew experience, combined with on-the-job training, and appropriate specialised training, and defined and proven practice and process would meet the intent of the NPA and enhance flight safety with an acceptable level of investment without significant financial burden on the industry. Therefore Pilatus can not agree to the content of this NPA and specifically opposes the requirements set forth in A.3, A.4 and A.5.
response	*Not accepted* A.1 Introduction: The Agency has reviewed the comments with a review group where industry and flight test Training schools were represented. We believe that the changed text represents a minimum standard for safety. **As this standard covers a significant breadth and depth of knowledge, it will help crews moving to one aircraft to another or to approach new technologies**. A grand-father clause has been introduced to allow existing flight test crews to continue doing their job. Monitoring the flight test activities will be done using the flight test operations manual. A.2 Categories of Flight Test: The 4 categories are covering the vast majority of flight tests to be performed. We expect that the flight test operations manual would provide the necessary complements to cover the kind of specific flights described here. A.3 Categories of Aircraft/Engine Type: Agreed, the criteria of propulsion has been replaced by a criteria of performance (Speed and altitude). In that context, we felt that there was no need to further distinguish between single and twin engine aeroplanes. A.4 Flight Test Aircrew Training and Experience: Please see response to A1. A.5 Specifications for test pilot school courses: We have now established detailed syllabus in cooperation with the schools and Industry. A.6 Conclusion: Please see reply to A1.

comment	*28* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc* The title doesn't seem to be appropriate because cases 1 and 2 are also addressed in this Appendix (with reference to Part FCL). The text "*engaged in categories 3 and 4 of flight testing*" should then be removed.
response	*Accepted* The title has been changed. Refer to the proposal for further details.

comment	*29* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc* The example of "38 hours on 12 types of airplanes" may be misunderstood as a requirement and should then be removed. Indeed, it is arguable to impose experience on dozen of types of airplanes when an organisation only deals with one or a small number of aircraft types.
response	*Partially accepted* The Agency and the flight test group including industry and flight test school reviewed and rewrote that part of the AMC. As an example, for competence level 2 FTE courses for aeroplanes, it was decided to request 30 hours of flight training on at least 5 different aircraft types of which at least 1 should be certificated in accordance with CS-25 standards. Refer to the proposal for further details.

comment	*30* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc* 1- Requirements on briefings doesn't seem to be justified here, as it is not clearly listed in the corresponding paragraph of Appendix XII. 2- Requirements on the briefings durations ("several hours for each flight") doesn't seem to be relevant as well. The organisation in charge of the Flight Tests should be free to judge the necessary amount of time needed for an efficient briefing.
response	*Partially accepted* The Agency and the flight test group including industry and flight test school have reviewed and rewritten that part of the AMC. Refer to the proposal for further details.

comment	*36* comment by: *ADAC Luftfahrt technik* Presumably the required flight test competence and - experience should be for categories 1 and 2; categories 3 and 4 here do not make any sense.
response	*Accepted* See response to comment 56.

comment	*56* comment by: *Diamond Aircraft Ind. GmbH* AMC to Appendix XII to Part-21

IS: "Competence and experience of flight engineers and of pilots engaged in categories 3 and 4 of flight testing"

When reading this AMC it seems that a BSC or equivalent university standard is required for engineers and pilots for cat. 3 and 4. From our point of view this is exaggerated and impracticable.

Therefore correction of the title or the statement under (a) is necessary.

The requirements stated under (b) "15 weeks course, 38 flying hours on 12 types of airplanes" is exaggerated for cat 3 and 4 engineers and pilots who are usually trained in house for the relevant tasks like shown in table of Appendix XII (c)

response *Accepted*

Headline of the AMC is misleading.

The Agency with the flight review group reviewed the paragraph (d) 'competence and experience of flight crews' of the Appendix XII and the corresponding AMC.

Reference to BSC or equivalent university standard has been deleted.

Please refer to the proposal for further details.

comment *58* comment by: *Diamond Aircraft Ind. GmbH*

AMC to Appendix XII to Part-21:

(c) IS "...have participated in all flights on at least five aircraft up to their individual certificate of airworthiness"
SHOULD BE: "... up to the issuance of statement of conformity (EASA From 52) for production purposes or declaration of conformity for design purposes"

Justification:

Issuing a certificate of airworthiness is an authority task (see Part-21 Subpart H)
There is no benefit in mixing organisation tasks with authority tasks.

response *Not accepted*

The Agency and the flight test review group including industry and flight test school reviewed that issue and it was agreed to keep the wording.

comment *66* comment by: *ENAC*

III AMC to appendix XII to Part 21

(a) The qualification should be assessed and the approval released by the competent Authority.
(b) ENAC strongly recommends the same requirements as paragraph (a) are applied and the qualification should be assessed and approval released by the competent Authority. In other words, it should be the same as (a).
(c) All the qualification requirements (competence, specific training course) to

be satisfied in order to be qualified to carry out the activities should be identified. The qualification should be assessed and approval released by the competent Authority.

response *Partially accepted*

For FTP, the competent authority will approve the school and oversee the certificate.

Training of FTE will be under the responsibility of the DOA. It will be reviewed by the Agency during DOA approval process.

However, the situation would change if the process outlined in the response to comment 127 would lead to a licensing scheme for LFTE.

comment *98* comment by: *Walter Gessky*

AMC to Appendix XII to Part 21:
a. Item 1.a), second sentence:
Add the following:
Bachelor of Science or equivalent university standards, **engineering degree or an adequate experience** are usually requested from applicants.
Justification:
Either deleted or added that other kinds of standards are equivalent.

b. 1(b) third bullet:
Change the following:
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
Justification:
In house training should be also allowed for other aircraft than large aeroplanes.

response *Partially accepted*

The Agency and the flight test review group including industry and flight test schools have reviewed and changed the wording to clarify the wording of the AMC.

Comment 1 : Reference to bachelor or equivalent university standards was suppressed.

Comment 2: Condition (Competence level) 1/2 Training course for FTP must be done in an approved training school while training course of FTE has to done under DOA responsibilities.

comment *125* comment by: *ECA- European Cockpit Association*

AMC to Appendix XII to Part 21.1.(c)
(c) Flight crew members must:
[redraft]
~~*- 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.~~

The proposed requirements are not clear and sometimes make no sense.
A candidate for a test flying license cannot have previous experience as a test pilot. The candidate could not have participated as crew member in a previous test flight.

ECA sees some requirements based, among other things, on training and in experience as observer of flight tests, depending on the risk, as part of the technical crew but without being part of the active flight crew.

response *Noted*

As the wording was not clear enough, it has been reviewed in coordination with industry and flight test schools.

For Category 3 flights, pilots must comply with FCL700. However, Pilots in command only must have gained a significant amount of experience relevant to the task. Co-pilots will take benefit of the flights as co-pilot to get experience in order to have the amount requested for a PIC.

comment *137* comment by: *Franz Redak*

AMC to App. XII to Part 21: We believe that the headline contains a Typo and should be changed to: "...engaged in CAT 1 and CAT 2 of flight testing."
(1)(a) SAD believes that a specific training course for CAT 3 and 4 flight tests is not appropriate. The wording here is also far more restrictive than in the wording for Appendix XII - (c)(2) where it is specified: ..flight test engineer must be suitably qualified...
and 24(b)(i)(4) where a clear statement about the limited training need for flight crew members is specified.

response *Partially accepted*

The Agency and the flight test review group including industry and flight test schools have reviewed and changed the wording to clarify the wording of the AMC.

It was agreed that only Category 1 and Category 2 flight tests need to have completed a condition (competence level) 1 or condition (competence level) 2 course.

However, competence and training for Category 3 and Category 4 will be defined in the FTOM which has to be accepted by the Agency or the authority.

comment *152* comment by: *LHT DO*

We suppose that the headline of this AMC is not correct:

The reqirements (a), (b) and (c) are definitely not for cat 4 test flights.
It contradicts the GM to Appendix XII to the Part-21 definition of category 4

flight tests.

(d) should indicate the categories for which it is valid.

response *Accepted*

Text was re-organised. New AMCs with new titles are now provided.

comment *175* comment by: *CEV. France*

CEV Comment n°10

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)
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.

Comment : It is requested for engineer to follow the same outline as pilots. As far as test pilot training (see AMC to FCL.820) is insufficiently detailed, this sentence is not satisfactory and as a consequence, training for pilot and engineer has to be given in detail.

response *Partially accepted*

The Agency and the flight test review group including industry and flight test schools reviewed the corresponding paragraph and defined a FTE syllabus.

However, it has to be understood that FTP training syllabus must be done in an approved flight test school, while FTE training course will be under the DOA responsibilities.

comment *182* comment by: *President, Society of Experimental Test Pilots*

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

(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.

Move the above comment referencing "all flights on at least five aircraft" to a point below the last bullet statement that pilots hold the relevant type or class rating issued in accordance with Part-FCL.

Concern: The above requirement as written applies to flight crew members in general and not to pilots specifically. The requirement as currently written extends this requirement to large airplanes.

Reason: During flight tests of large airplanes which have already been granted a production certificate, the experience gained by a flight test engineer on tests that lead to issuance of an airplane's individual certificate of airworthiness is minimal. Generally, flight test engineer participation is not required in the production flight test process unless a flight test is required for a new installation or modification to the type certificate, which would change the definition of this particular testing from category 3 to category 4. However, flight test experience during the production process for pilots is valuable, beneficial towards the pilot's overall experience and training and specifically improves their ability to proceed towards Cat 2 or Cat 1 testing.

response

Partially accepted

Wording of the AMC to the Appendix XII has been reviewed in coordination with industry and flight test schools

- the single seat aircraft was not anymore considered as the Appendix XII applies only to aircrafts above 2 000 kg.
- For Category 3 flights, pilots must comply with FCL.700. However Pilots in command only must have gained a significant amount of experience relevant to the task. Co-pilots will take benefit of the flights as co-pilots to get experience in order to have the amount requested for a PIC.

The Agency agrees with the commentator's statement 'flight test experience during the production process for the pilot is valuable and beneficial towards the pilot's overall experience and training'.

comment

203 comment by: *ETPS CI*

B. Draft Opinion; II. Amendments to Part-21; Addition of new Appendix XII

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

Comment 2. Creates confusion as to whether this section deals with pilots and engineers in categories 3 & 4 or engineers in all categories and only pilots in categories 3 & 4. Recommend change to: "…. pilots engaged in categories 3 and 4 and FTEs engaged in all categories of flight testing"

response

Accepted

The paragraph (d) of the Appendix XII was reviewed in order to clarify competence and experience of flight crews requirements.

comment

212 comment by: *SPANAIR*

3.- TRAINING

Flight tests after maintenance to show compliance with the certification basis require the aircraft to approach its operational limits.

Such flights must be conducted by experienced line pilots, as in the case of acceptance flights of newly delivered airplanes or after overhaul.

Consequently, pilots and engineers dedicated to Technical Test Flights, qualified in accordance with EU-OPS and national rules implementing JAR-OPS 3 and JAR-FCL, must hold specific training and qualifications.

Training Courses approved by the competent authority must be given by authorised training organizations and cover certain specific areas, including theory, simulator and flight training for upset recovery.

For dealing with degraded aircraft systems, these training courses will cover Performance, Handling Qualities, Systems and Test management:

- Degraded Flight Controls System
- Degraded equipment
- Degraded Instruments
- Aerodynamics
- Certification Rules
- Upset Recoveries
- Hazard Assessment

When such training is provided in-house in the case of large commercial (e.g. CS25) aeroplanes, ground training may be provided by the company as part of their job and flight training during real test flights. The trainee is added to the normal flight test crew.

COMPETENCE AND EXPERIENCE OF FLIGHT TEST CREWS:

Flight test crew members must:

- have been appointed by the operator performing the flight test;
- hold a valid pilot licence appropriate to the category of aircraft under test issued in accordance with Part-FCL;
- hold the relevant type or class rating issued in accordance with Part-FCL;
- have been trained for flight testing activities;
- have gained a significant amount of flight experience relevant to the task

response

Noted

Maintenance flights are not regulated by this rule.

Maintenance check flights are discussed under task RMT.0393 (MDM.097) (a) and (b) that should finish in the 2014-2015. The comment will be passed to the

people responsible for the task.

comment

229 comment by: *Airbus*

Attachment #4

THIS COMMENT IS SUBMITTED ON BEHALF OF ASD

AFFECTED PARAGRAPH:
AMC to Appendix XII to Part 21

PROPOSED CHANGE:

Replace this AMC by the attached one.

JUSTIFICATION:

- Tabular form more user-friendly.
- Our proposed changes result from analysis of European industry's current best practices and experience.

response

Partially accepted

The Agency and the flight test review group including Industry and flight test schools reviewed paragraph (d) of the Appendix XII and its corresponding AMC in order to clarify and include changes which were acceptable.

Please read the changed text for more details.

comment

237 comment by: *Boeing*

Page: 24
Section III. AMC to Appendix XII to Part-21

In the new text under. *"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,"* Boeing suggests the following changes be made:

Change paragraph 1.(a) to allow for an equivalent combination of training and experience to fulfill the competency and experience requirements for large airplane testing, as follows:

> *"(a) The flight test engineer must have satisfactorily completed a specific training course approved by the competent authority, **or equivalent combination of training and experience**."*

JUSTIFICATION: Requiring a specific approved training course as a training requirement for flight test engineers is restrictive, and represents a much less relevant and productive course of study than a training program customized to the testing methods and goals of the flight test organization.

Training obtained in courses and career development activities developed in-house and administered by the test organization is directly relevant to the flight testing conducted by that flight test organization. Modifications to the training program can be made to reflect current needs of the organization and can be

customized to prepare the flight test engineers for a specific upcoming flight test program if needed. In addition, training can be accomplished on a more flexible schedule to accommodate existing flight testing and required training simultaneously.

response

Not accepted

Paragraph (d) of the appendix and the corresponding AMC have been reviewed by the Agency and a flight test review group including Industry and flight test schools.

It was recognised that among the flight test engineer, only the one which is 'assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities' must have satisfactorily completed a competence level 1 or competence level 2 course.

In addition, the training course should be competency based and previous experience, skills and theoretical knowledge should be taken into account to define it.

comment

238 comment by: *Boeing*

Page: 24

Section III. AMC to Appendix XII to Part-21

In the new text under *"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,"* Boeing requests the following changes be made:

Rearrange the bulleted items under paragraph 1.(c) by moving the bullet referencing *"…all flights on a least five aircraft"* to a point below the last bullet statement that concerns pilots holding the relevant type or class rating issued in accordance with Part-FCL, so that the paragraph reads as follows:

(c) Flight crew members must:

- *have gained a significant amount of flight experience relevant for the task; and:*
- *in the case of single-pilot aircraft, have received a detailed briefing on the flight test to be performed; or*
- *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.] and*
  - *have participated in all flights on at least five aircraft up to the issuance of their individual certificate of airworthiness."*

JUSTIFICATION: The proposed requirement, as written, applies to flight crew members in general and not to pilots specifically. The requirement as currently written extends this requirement to large airplanes.

During flight tests of large airplanes that have already been granted a production certificate, the experience gained by a flight test engineer on tests that lead to issuance of an airplane's individual certificate of airworthiness is minimal. Generally, participation of the flight test engineer is not required in the production flight test process unless a flight test is required for a new installation or modification to the type certificate, which would change the definition of this particular testing from CAT 3 to CAT 4. However, flight test experience during the production process for the pilot is valuable and beneficial towards the pilot's overall experience and training.

response

Partially accepted

Wording of the AMC to the Appendix XII has been reviewed in coordination with industry and flight test schools

- the single seat aircraft was not anymore considered as the Appendix XII applies only to aircrafts above 2000kg.
- Pilots must comply with FCL700. However Pilot in command only must have gained a significant amount of experience relevant to the task. Co-pilot will take benefit of the flights as copilot to get experience in order to have the amount requested for a PIC.

The Agency agrees with the commentator's statement 'flight test experience during the production process for the pilot is valuable and beneficial towards the pilot's overall experience and training'.

comment

239 comment by: *Christophe SERGENT*

EAD Aerospace Comments posted by Mr Christophe Sergent (Head of quality Office, christophe.sergent@eda-aerospace.com) on january 30th 2009.

AMC to Appendix XII to Part-21
1. Competences and experience, (c) flight crew members :
The both sentences "have participated...of airworthiness" and "in the case of pilots...complete package of flights" seem not be clear to us. Could you give us a practical example on these items ?

Thank You.

response

Noted

The paragraph (d) of the Appendix XII has been reviewed and gives now the competence and experience of flight test crews.

comment

244 comment by: *Air France - Maintenance Quality Assurance*

Could EASA create a dedicated AMC for category 3 and an other for category 4. Category 3 is "production flight test" while category 4 is "DOA for airline / MRO design changes flight test". The merging of these 2 categories of flight tests in one AMC is not clear enough.
About the paragraph (b), the example of experience and training shows 15 weeks courses and 38 flight hours on 12 types of airplane. This is too much for a simple test flight of category 4 and this is exactly the same example you gave in the Regulatory Impact Assessment about the economic considerations for category 2, flight tests. The example of training and experience can't be the

same for category 2 and 4.

response

Accepted

The Agency with the flight review group reviewed the definition of categories of flight tests a in the Appendix XII and extensively modified the corresponding GM to clarify the categories of flight tests concept.

Requirements for competence and experience are not the same for Category 2 and Category 4 flight tests.

For Category 4 flight test, pilots must 'only' hold a valid licence and the pilot in command and the FTE must have been appointed by the organisation via the FTOM.

comment

252 comment by: *KLM EASA DOA 21J.012*

Attachment #5

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

(2) Category Two

"- Flights done in the part of the flight envelope already opened" should be defined/explained.
We suggest to visualize it and define the indicated area in this context:
Flight envelopes see diagram in document 6 attachement

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.
The consequence of a Category classification is rather big (especially for non-TC companies). Therefore a more detailed guidance for distinct between Category 2 and 4 flight test is requested. The example tries to clarify the boundary between flight tests Category 2 and 4. The given examples are much to general, not all TCAS or EGPWS flight tests have a risk level that requires Category 2 measures. The TCAS example (presented as a typical Category 2 test) is not correct in all cases. The Advisory Circular for TCAS installation allows a test with targets of opportunity to test all repeat applications. This test is a typical Category 4 flight test.
Because it is difficult to provide top-level guidance for flight test Category classification of new or modified systems it is recommended to make the flight test Category classification dependent of a safety assessment and provided only guidelines for the classification. For the Permit to Fly also an assessment of the situations and conditions required for a safe flight is requested (ref. AMC 21A.263). It should be possible to use this also for the determination of the flight test Category classification.

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:
We suggest the following change, add:
- A Flight Test Engineer (FTE) is a crew member who acts as a test conductor/coordinator
during the test flight and/or participates in the operation of the aircraft and its systems.

(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.
Please clarify/define for CAT1, 2, 3 and 4 "specific training course approved by the competent authority"

(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.

There are situations where flight crew (pilot, flight test engineer) with the competence and experience mentioned above is not available. For those situations it would be desirable to have an alternative approach where the requirements are tailored to the actual situation.

response *Partially accepted*

The Agency with the flight review group reviewed the definition of categories flight a in the Appendix XII and extensively modified the corresponding GM to clarify the categories of flight tests concept.

The following definition of the lead FTE was retained:
Lead FTE is 'a flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities'.

It has to be understood that he is the only engineer on board which needs to have competence and experience as defined in Appendix XII. See also response to comment 314.

comment *257* comment by: *Alenia Aeronautica*

THIS COMMENT IS SUBMITTED ON BEHALF OF ALENIA AERONAUTICA
AFFECTED PARAGRAPH:
AMC to Appendix XII to PART 21

At the end of paragraph (a) add the following:
"Lead flight test engineers involved in Cat.1 flights must have logged, besides the flying activity included in the certification course, a minimum of 30 additional flying hours as trainee Flight Test Engineer"

JUSTIFICATION
The flying time logged during the completion of an approved Cat.1 or Cat.2 training course is by definition adequate for FTE involvement in Flight Test activities in the corresponding category. Additional flying activity to be logged as a trainee besides the qualification training courses should be minimised (also due to costs and time reasons), and should be reduced for Cat.2 flights

In para (b) after "An example of such.....on 12 types of aeroplanes" add the following:
"Lead flight test engineers involved in Cat.2 flights must have logged, besides the flying activity included in the certification course, a minimum of 10

additional flying hours as trainee Flight Test Engineer"
JUSTIFICATION

The flying time logged during the completion of an approved Cat.2 training course is by definition adequate for FTE involvement in Flight Test activities in the corresponding category. Additional flying activity to be logged as a trainee besides the qualification training courses should be minimised (also due to costs and time reasons) and should be reduced in comparison to Cat.1 flights requirements

In para (c) add
"- in the case of Flight Test Engineers involved in Cat.3 flights, have been accurately briefed on the content of production flights to be performed for the issuance of an individual Certificate of Airworthiness and have participated to all flights of al least one production aircraft up to its acceptance, according to the production acceptance specification approved requirements"

JUSTIFICATION
The task of Flight Test Engineers during production flights is generally limited to support pilots in monitoring the a/c performance and systems behaviour during standard manoeuvres to be carried out according to the production acceptance specification and performed within the certified operational flight envelope.

response *Partially accepted*

The Agency and the flight test review group defined syllabi for FTP and FTE.

The following experience has been requested for the 'lead test engineer' only:

Minimum flight experience for FTE category 1 to operate as FTE on a Category 1 flight is 100 hours.

Minimum flight experience for FTE category 2 to operate as FTE on a Category 1 flight is 50 hours.

Significant amount of experience is requested for FTE flying in a Cat3 flight. As experience will depend of the class or the type of aircraft, it was the review group opinion that the amount of experience has to be defined case by case in the FTOM. The FTOM will be reviewed by EASA or competent authority to ensure a proper oversight of the quality of the test crews.

comment *265* comment by: *DGAC FRANCE*

AMC to Appendix XII to Part-21 paragraph 1.(a) first following sentence :
"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."

Comment : It is requested for engineer to follow the same outline as pilots. As far as test pilot training (see AMC to FCL.820) is insufficiently detailed, this sentence is not satisfactory and as a consequence, training for pilot and engineer has to be given in detail.

response

Accepted

The Agency, in coordination with industry and flight test schools has now defined detailed syllabi for FTE in the AMC to Appendix XII to Part-21.

comment

312 comment by: *Fokker Services*

Competence and experience of flight test engineers and of pilots engaged in categories 3 and 4 of flight testing
1. Competences and experience:

The ASD-proposed tabular form replacing the proposed AMC material is preferred.
Nevertheless we have the following comments:

It is not clear whether the items a) through d) stand for Categories of Flight Tests

response

Accepted

That paragraph has been reviewed. The paragraph (d) of the appendix XII now clearly defines the competence and experience flight crews.

comment

313 comment by: *Fokker Services*

(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.

The subjects mentioned here, e.g. Performance, Handling Qualities and Systems are of much less importance to a Flight Test Engineer as compared to a Test Pilot. If procedures as laid down in the FTOM require that specialists in the above mentioned areas have to aprove the flight test program and take part in the Flight Safety Analysis, there is no need for an extensive training of Flight Test Engineers. However, it is recognized that Test Pilots have to be competent to immediately react to unforeseen situations during flight testing and therefore need to be trained to act adequately. This requires a good understanding of performance and flight handling and a good knowledge of system operation.
It is therefore proposed to delete the stringent requirements for Flight Test Engineers with respect to both the approved training course and the required level of education.
For Category 1 and 2 an in-house training to achive the competences and experience for Flight Test Engineers as described in the FTOM shall be allowed.

response

Not accepted

The agency has now defined the syllabi in coordination with Industry and Flight test schools. Issues mentioned in the comment have been addressed in the review group meetings. It was recognized that the LFTE which is "flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during

flight test activities" needs to have competence and experience as defined in Appendix XII.

See also response to comment 314.

comment *314* comment by: *Fokker Services*

(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.

There are situations where a flight test engineer with the competence and experience mentioned above is not available. For those situations it would be desirable to have an alternative approach where the requirements are tailored to the actual situation.

Therefore it is recommended to make it also possible to specify the flight test engineer competence and experience requirements in the Permit to Fly; Flight Conditions. The Flight Conditions of a Permit to Fly may include requirements for crew qualifications (ref. 21A.708 (b)2.)

response *Not accepted*

Competence and experience of FTE and FTP are defined in Part FCL and Appendix XII of Part 21. The flight conditions of a permit to fly could only include requirements consistent with the requirements as said above.

However, and regarding the concern above, the Agency wants to insist on the fact that the only FTE for which it is requested to have specific competence and experience as defined in that appendix is 'the flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities'.

The flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its system during flight test activities"

In addition, it is up to the DOA holder to decide if a lead flight test engineer or a flight test engineer is needed on board or not.

comment *327* comment by: *Society of Flight Test Engineers*

Affected Paragraph: 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.

"The Flight Test Engineer must have gained a significant amount of flight test experience relevant to the task, and must have been trained for flight testing activities."

	Concern from SFTE: The title of this AMC appears to be incompatible with other contents of the NPA, and may instead be referring to ***categories 1 and 2*** of flight testing. Nevertheless, the requirements as listed are extreme, unnecessary and will impose undue financial burden without appreciably improving flight test safety (and may have adverse effects on test safety). Justification: "Significant" is not defined in the NPA, training considered "relevant to the task" and "trained for flight testing activities" are not specified in the NPA. SFTE recommends that EASA establish ***FTE training guidelines and recommendations*** to be outlined in the proposed Flight Test Operations Manual. Required training (per the NPA as currently written) will pose an undue and unnecessary burden on both Flight Test Organizations and Flight Test Engineers. Category 3 testing involves previously certified aircraft, yet FTE's would not be permitted to participate unless the have completed all flights of five type certification projects – a dilemma in which no FTE could begin gathering experience leading to Category 1 or 2 authorization.
response	*Partially accepted* The AMC title: '*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*' is misleading as it could be understood that this paragraph is only speaking of Flight test engineers involved in Category 3 and Category 4. The title, as well as the paragraph, have been modified. Competence and experience for each category of flight have been clearly defined for FTE and FTP in the Appendix XII paragraph (d) which has been extensively reviewed. Minimum flight experience for FTE category 1 to operate as FTE on a Category 1 flight is 100 hours. Minimum flight experience for FTE category 2 to operate as FTE on a Category 1 flight is 50 hours. Significant amount of experience is requested for FTE flying in a Category 3 flight. As experience will depend of the class or the type of aircraft, it was the review opinion that the amount of experience has to be defined case by case in the FTOM. The FTOM will be reviewed by the Agency or competent authority to ensure a proper oversight of the quality of the test crews.

Appendix A - Revised text Flight Testing

I. Amendments to Commission Regulation (EU) No 748/2012

Entry into force and transition measures to be included in the Regulation amending Commission Regulation (EU) No 748/2012:

Article …

Entry into force and transition measures

1. This Regulation shall enter into force 20 days after its publication in the *Official Journal of the European Union*.

2. By way of derogation from (1.), the competence and experience requirements established in Appendix XII to Part-21 shall become applicable by [*36 months following publication of this amendment to Part-21*].

3. By way of derogation from (1.), the requirement for a flight test operations manual established in Part-21A.143 and Part-21A.243 shall become applicable 12 months following publication of this amendment to Part-21.

4. By way of derogation from (1.) and (2.), a Member State may continue to apply its national licensing scheme for the flight test crew members other than pilots until Dec 31, 2016, provided that it was issuing these types of licenses up to the date of entry into force of this Regulation.

5. Flight test pilots engaged in Category 3 and/or 4 of flight test and flight test engineers who before the entry into force of this Regulation have conducted flight test activities in accordance with national rules, are deemed to comply with the relevant requirements of Appendix XII to Part-21 and may continue to exercise their current scope of functions.

Applicants for or holders of a permit to fly may continue to use the services of these flight test pilots and flight test engineers within their current scope of functions. The current scope of functions of the flight test crew member shall be established by the applicant for or holder of a permit to fly that uses or plans to use their services, based on a list of the flight test crew members' flight test experience and training, and on the relevant records of the applicant for or the holder of a permit to fly. This present scope of functions shall be made available to the competent authority.

Any addition or any other amendment to the scope of the privileges given to these flight test crew members by the applicant for or holder of a permit to fly that uses or plans to use their services, 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. If flight tests are to be conducted, a flight test operations manual defining the organisation's policies and procedures in relation to flight test. The Flight Test Operations Manual (FTOM) shall include:

    i. A description of the organisation's processes for flight test, including the flight test organisation involvement into the permit to fly issuance process;

    ii. Crewing policy, including composition, competency, currency and flight time limitations, in accordance with Appendix XII to this Part;

    iii. Procedures for the carriage of persons other than crew members and for flight test training, when applicable;

    iv. A policy for risk and safety management and associated methodologies

    v. Procedures to identify the instruments and equipment to be carried;

    vi. A list of documents that need to be produced for flight test.

…

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 designed. If flight tests are to be conducted, a flight test operations manual defining the organisation's policies and procedures in

relation to flight test shall be furnished. The Flight Test Operations Manual (FTOM) shall include:

i. A description of the organisation's processes for flight test, including the flight test organisation involvement into the permit to fly issuance process;

ii. Crewing policy, including composition, competency, currency and flight time limitations, in accordance with Appendix XII to this Part;

iii. Procedures for the carriage of persons other than crew members and for flight test training, when applicable;

iv. A policy for risk and safety management and associated methodologies;

v. Procedures to identify the instruments and equipment to be carried;

vi. A list of documents that need to be produced for flight test.

…

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. any ~~the~~ conditions ~~and~~ or restrictions put on the flight crew to fly the aircraft~~,~~ in addition to those defined in Appendix XII to this Part.

…

5. Add a new Appendix XII as follows:

Appendix XII
Categories of flight and associated flight test crews' qualifications

(a) General

This Appendix establishes the qualifications necessary for flight crew involved in the conduct of flight tests for aircraft certified or to be certified in accordance with CS-23 with an MTOM of 2 000 kg and above, CS-25, CS-27 or CS-29 or equivalent airworthiness codes.

(b) Terminology

Flight test engineer is any engineer involved in flight test operation either on the ground or in flight.

'Lead Flight Test Engineer' designates a flight test engineer assigned for duties in an aircraft for the purpose of conducting flight tests or assisting the pilot in the operation of the aircraft and its systems during flight test activities.

(c) Categories of flight tests

1. General

The descriptions below address the flights performed by design and production organisations under Part-21.

2. Scope:

For the purposes of this Appendix, the following are considered flight tests:

- Flights for the development phase of a new design (aircraft, propulsion systems, parts and appliances);
- Flights to demonstrate compliance to certification basis or to type design for aircraft coming from the production line;
- Flights intended to experiment new design concepts, requiring unconventional manoeuvres or profiles for which it could be possible to exit the already approved envelope of the aircraft;
- Flight test training flights.

If more than one aircraft is involved in a test, each individual aircraft flight shall be assessed under this Appendix to determine if it is a flight test and when appropriate, its category.

The flights described above are the only flights that are under the scope of this Appendix.

3. Categories of flight tests

Flights tests include the following four categories:

Category One (1)

- Initial flight(s) of a new type of aircraft or of an aircraft of which flight and/or handling characteristics may have been significantly modified;
- Flights during which it can be envisaged to potentially encounter flight characteristics significantly different from those already known;
- 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 when flight envelope limits are approached;
- Flight test training for Category 1 flight tests.

Category Two (2)

- Flights not classified as Category 1 on an aircraft whose type is not yet certified;
- Flights which are not classified Category 1 on an aircraft of an already certified type, after embodiment of a not yet approved modification and which:
  - require an assessment of the general behaviour of the aircraft; or
  - require an assessment of basic crew procedures, when a new or modified system is operating or is needed; or
  - are required to intentionally fly outside of the limitations of the currently approved operational envelope, but within the investigated flight envelope.
- Flight test training for Category 2 flight tests.

Category Three (3)

Flights performed for the issuance of statement of conformity for a new-built aircraft which do not require flying outside of the limitations of the type certificate (TC) / aircraft flight manual (AFM).

Category Four (4)

Flights not classified as Category 1 or 2 on an aircraft of an already certified type, in case of an embodiment of a not yet approved design change.

(d) Competence and experience of pilots and lead flight test engineers

1. General

Pilots and lead flight test engineers shall have the competences and experience specified in the following table.

	Categories of Flight Test			
Aircraft	1	2	3	4
CS-25, CS-23 commuter or aircraft having an Md above 0.6 or a maximum ceiling above 25 000 ft, CS-27, CS-29 or equivalent airworthiness codes	Competence level 1	Competence level 2	Competence level 3	Competence level 4
Other CS-23 with an MTOM above 2 000 kg	Competence level 2	Competence level 2	Competence level 3	Competence level 4

Competence level 1:

The pilots shall comply with the requirements of Part-FCL.
The lead flight test engineer shall have:
- satisfactorily completed a Competence level 1 training course; and
- a minimum of 100 hours of flight experience, including flight test training.

Competence level 2:

The pilots shall comply with the requirements of Part-FCL.
The lead flight test engineer shall have:
- satisfactorily completed a Competence level 1 or level 2 course; and
- a minimum of 50 hours of flight experience, including flight test training.

The course shall cover at least the following subjects:
- Performance;
- Stability and control/Handling qualities;
- Systems;
- Test management;
- Risk/Safety management

Competence level 3:

The pilot(s) shall hold a valid licence appropriate to the category of aircraft under test, issued in accordance with Part-FCL and hold a CPL as a minimum. In addition, the pilot-in-command shall:
= hold a flight test rating;
or
= have:
- at least 1 000 hours as of flight experience as pilot-in-command on aircraft having similar complexity and characteristics and

- participated, for each class or type of aircraft, in all flights that are part of the programme leading to the issuance of the individual certificate of airworthiness of at least five aircraft;

The lead flight test engineer shall have:

- satisfy competence level 1 or 2 or,
- gained a significant amount of flight experience relevant to the task; and

- Participated in all flights that are part of the programme leading to the issuance of the individual certificate of airworthiness of at least five aircraft.

Competence level 4:

The pilot(s) shall hold a valid licence appropriate to the category of aircraft under test, issued in accordance with Part-FCL and hold a CPL as a minimum. The pilot-in-command shall hold a flight test rating or have at least 1000 hours as pilot-in-command on aircraft having similar complexity and characteristics.

Competence and experience for lead flight test engineers is defined in the Flight Test Operations Manual.

2. Lead flight test engineers

Lead flight test engineers shall receive an authorisation from the organisation that employs them detailing the scope of their functions within the organisation. The authorisation shall contain the following information:

- Name
- Date of birth
- Experience and training
- Position in organisation
- Scope of the authorisation
- Date of first issue of the authorisation
- Date of expiry of the authorisation if appropriate
- Identification number of the authorisation.

Lead flight test engineers shall only be appointed for a specific flight if they are physically and mentally fit to safely discharge assigned duties and responsibilities.
The organisation shall make all relevant records related to authorisations available to their holders.

(e) Competence and experience of other flight test engineers.

Other flight test engineers on board the aircraft shall have an amount of experience and training commensurate to the tasks assigned to them as crew members, in accordance with the flight test operations manual.
The organisation shall make all relevant records related to their flight activities available to their holders.

AMC and GM to Part-21

6. A new AMC to paragraphs 21A.143, 21A.243 and to 21A.14(b), 21A.112B(b) and 21A.432B(b) is inserted as follows:

AMC to 21A.143, 21A.243, 21A.14(b), 21A.112B(b) and 21A.432B(b)
Flight Test Operations Manual (FTOM)

1. General
   a. Scope: The FTOM covers flight test operations.

   b. Format: The FTOM may:
      - be included in the DOA/POA/APDOA documents or,
      - be a separate manual.

      The FTOM may make reference to other documents to cover the contents listed below, e.g. for record keeping

   c. Use by contractors and sub-contractors: When test flights are done by contractors or sub-contractors, they should comply with the FTOM of the main organisations, unless they have established an FTOM in compliance with Part-21.

2. The FTOM should contain the following elements:

   (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 flight test activities. It should also mention the coordination between all departments affecting flight test, e.g. Design Office, Production and Maintenance, in particular coordination for the establishment and update of a Flight Test Programme.

   (b) Risk and safety management:
   The FTOM should describe the organisation's policy in relation to risk and safety assessment, mitigation and associated methodologies.

   (c) Crew members:
   According to the category of test, the FTOM should describe the organisation's policy for the composition of the crew (Including the need to use a lead flight test engineer) and the competency and currency of its flight crew members, including procedures for appointing crew members for each specific flight.
   All crew members should be listed in the FTOM.
   A flight time limitation policy should be established.

   (d) Carriage of persons other than crew members:
   According to the category of test, the FTOM should describe the organisation's policy in relation to the presence on-board of people other than crew members (i.e. with no flying duties).
   People other than crew members should in principle not be allowed in category 1 flight tests.

   (e) Instruments and Equipment:

The FTOM should list, depending on the nature of the flight, the specific safety related instruments and equipment that should be available on the aircraft or carried by people on board.

The FTOM should contain provisions to allow flights to take place in case of defective or missing instruments or equipment

(f) Documents:

The FTOM should list the documents to be produced for flight test, and include (or refer to) the procedures for their issue, update and follow-up:

(i) Documents Associated with a Flight Test Programme:

- Flight Order for a given flight should include:
  - Listing of the tests to be performed and associated conditions
  - Category of the flight (e.g. category 1)
  - Composition of crew
  - Names of persons other than crew members
  - Loading of the aircraft
  - Reference to approved flight conditions
  - Restrictions relevant to the flight to be highlighted to the crew
- Flight crew report

(ii) Documentation and information to be carried on the aircraft during flight test

(iii) Record keeping: the FTOM should describe the policy relative to record keeping.

(g) Permit to fly:

The FTOM should describe the role of the flight test organisation regarding the procedures for the approval of flight conditions and the issue of permits to fly, in accordance with Subpart P.

(h) Flight test training:

The FTOM should describe how training for flight test is organised.

Currency of the flight crew may be ensured either through recent experience or refresher training.

Sufficient flight experience by year should be at least:

- For test pilot, 50 hours, including 20 flight test hours;
- For lead flight test engineer, 10 flight test hours.

In case of insufficient annual flight experience, flight crew members need to undergo refresher training, in accordance with a syllabus included in the FTOM.

7. A new GM to Appendix XII to Part-21 is inserted as follows:

GM to Appendix XII

Flight test categories

Test categories are defined in the Appendix in such a manner that an operator who wishes to classify a flight should, after having determined if the flight is a test flight according to the paragraph 'General', enter the definitions from the top. The question whether a flight is Category 1 or not should be first. If not, the question then should be if the flight should be Category 2, 3 or 4.

The purpose of this guidance material is to help operators to:

- determine if an operation is a flight test;
- classify the flight test depending on its purpose.

Other types of flights, such as maintenance check flights are not included in the flights described in this Appendix, and are therefore not subject to it.

a) General

The exploration of the flight envelope and the demonstration of the specifications require special techniques, knowledge and skills. Therefore, flight test training and/or specific experience is required to enable a test crew to:

- safely perform systematic and comprehensive flight envelope exploration;
- acquire specific skill and ability for some particularly difficult tests;
- mitigate risks by anticipating potentially hazardous situations, and by applying methods that permit the safest flight possible in these situations;
- understand, as far as flight is involved, certification regulations, and
- learn methods to assess whether the aircraft or its systems comply with these regulations.

It should be noted that the classification of a test flight is primarily linked to considerations of special techniques and skills, and therefore is based on the crew's competence, rather than on the status of the aircraft.

Nevertheless,

- flight tests of an aircraft, which type has not yet been certified will be considered either Category 1 or Category 2 until the type has been certified, and;
- flight tests for a modification of an already certified type may be category 1, 2 or 4, depending on the actual test purposes.

The rationale for this difference is the fact that a new aircraft type is considered under continuous assessment until issuance of the first TC.
Cases where more than one aircraft is involved:
Every aircraft used in multi-aircraft test configuration should be evaluated through this classification. Chase flights are a typical example of flights in which more than one aircraft is involved. The guiding principle should be the role of the crew of the chase aircraft in the safety of the aircraft under test.

b) Category 1

Below are examples of Flight Tests to be considered as Category 1:

- When specific skills and abilities for some particularly difficult tests are required, for example VMCG, VMU, Spin on fixed wings, or H/V diagrams and category A engine failures on helicopters;
- When knowledge of the aircraft is not sufficiently complete;
- Where encounter of surprising or even hazardous flight characteristics can be envisaged and prepared;
- Upon determination, aircraft handling and performance in conditions where at least one of following parameters is approaching the actual limits of the aircraft envelope: altitude, attitudes, weights, centre of gravity, speed/Mach, stalls, temperature, engine and airfoils performance;
- Where the embodiment of new systems is anticipated to significantly affect the aircraft's handling characteristics;
- When the crew of the chase aircraft has the duty to assist the spinning aircraft crew in assessing the spin or triggering recovery actions.

c) Category 2

Below are examples of Flight Tests to be considered as Category 2:

- The flight envelope is already opened and showed that the behaviour of the aircraft is generally safe and no undesirable flight characteristics are anticipated.
- All-engines-operative climb performance.
- Cruise performance.
- Static stability demonstration.
- Function and reliability flights.
- Systems tests of autopilot or guidance / warning systems like TAWS, TCAS, etc., when the modes themselves are tested, requiring operating the aircraft in deviation of the standard operational procedures, or when, in the case of embodiment of such systems on an already approved aircraft, the system integration in an existing cockpit requires, , a more global crew procedure assessment - for example, when all warnings and HMI are integrated in cockpit screens and in a centralized warning system which requires a new cockpit procedure assessment (see Category 4 for examples that would fit that category).

d) Category 3

These flights are usually called industry production flights. They are performed on each new aircraft whose type is already certified. The aim is to check if the aircraft and its systems are working properly and conform to the certified type. As the type is already certified, the behaviour of the aircraft is normally known.
However, experience has shown that during production flights of a new aircraft, unexpected failures can occur which could not be described in the aircraft flight manual. This is the reason for which special experience should be required.

It should be noted that the TC or STC should be issued in order for a production flight to be considered as Category 3. Until a TC or STC is granted, any flight, including production flights, will be Category 1, 2 or 4 according to classification criteria.

It should be noted also that, if the flight of an aircraft just produced out of the assembly requires flying outside the AFM limitations, then this flight should be considered as a Category 2 flight.

e) Category 4

Typical flights are those required by a DOA to show compliance with airworthiness requirements of 'not yet approved data' after airline/MRO design changes like:
- cabin conversion;
- zonal drying system installation;
- Emergency Locator Transmission (ELT) installation;
- New cabin installation;
- cabin aircraft location pictorial system installation;
- new entertainment system installation;
- SATCOM and Telephone installation, and;
- New radio equipment installation.

Category 4 also includes flights after embodiment of guidance / warning systems which are not Category 2 and for which:
- good functioning test only is required, and;
- There is no need to fly the aircraft outside the aircraft AFM limitations.

The modification should not affect the behaviour of the aircraft in any way.

However, there may be modifications whose tests, despite the fact that they have no influence on the behaviour of the aircraft, require flying in conditions which deviate significantly from standard operational use of the aircraft. These unusual flight test

conditions may require classifying the flight in Category 2, as above-mentioned. The typical example to consider here is the approval of the modification of an already certified TAWS system. In this situation, it is required to fly at very low altitude and / or towards high terrain. Such a flight can be classified as a Category 4 flight on a light aircraft (or helicopter) because that test flight is performed in a domain corresponding to the normal operation of the aircraft, whereas the same flight made on a heavy CS-25 aircraft, especially if it needs to be flown in clean configuration significantly below gear and flaps warning heights, should be classified in category 2 because such a flight does not correspond to the normal use of the aircraft and needs to adopt specific testing procedures as demonstrated in Category 2 training.

8. Three new AMC to Appendix XII to Part-21 are inserted as follows:

AMC 1 to Appendix XII
Competence and experience of test pilots for Category 3 and 4 flight tests and lead flight test engineers

Definition similar 'complexity and characteristics':

Similar 'complexity and characteristics' for aircraft can normally be assumed for aircraft certified in the same certification specification e.g. CS-23 / CS-25. However, it could be considered that aircraft certified under different specifications but having small difference in weight and operating procedure (e.g. Citation 525 / Citation 550, 560) have similar complexity and characteristics

Flight experience for lead flight test engineers:

The flight experience includes experience as a crew member in flight test or in other flights (e.g. flights as a student pilot or with a pilot licence).

AMC 2 to Appendix XII
Training courses for lead flight test engineers (lead FTE).

GENERAL

1. Competency based training.

1.1 Lead FTE Training courses should be competency based. The training programme should as much as possible follow the syllabus outlined below, but may be adapted taking into account the previous experience, skill and theoretical knowledge level of the students.

1.2 It should also be recognised that the syllabi below assume that suitable flight test experience will be gained subsequent to attendance on the course. Should the student be significantly experienced already, then consideration should be made of that experience and it is possible that course content might be reduced in areas where that experience has been obtained.

1.3 Furthermore, it should be noted that lead FTE courses are specific both to a certain category of aircraft (aeroplanes or helicopters) and to a certain category of flight test (category 1 or 2). Therefore, a lead FTE wishing to extend their privileges to further categories of aircraft or to further categories of flight test (this is only relevant for someone having already undertaken a category 2 course) should not be requested to undertake the same course as an 'ab-initio' applicant. In these cases, the organisation providing the training should develop specific 'bridge courses' taking into account the same principles mentioned above.

1.4. To allow proper consideration of the student's previous experience, a pre-entry assessment of the student's skills should be undertaken, on the basis of which the

organisation providing the training may evaluate the level of the applicant to better tailor the course. Consequently, the syllabi listed below should be regarded as a list of individual demonstrable competencies and qualifications rather than a list of mandatory training objectives.

2. Continuous evaluation

2.1. Training courses should be built on a continuous evaluation model, in order to ensure that successful completion of the course ensures that the student has reached the level of competence (both theoretical and practical) necessary to carry on his functions.

COURSE CONTENT

3. In addition, the content of the course should vary taking into account whether the wants to undertake category 1 or 2 flight tests, as well as the relevant category of aircraft, and their level of complexity. In order to better take these factors into account, training courses for a lead FTE have been divided into levels, similar to those for test pilots:

3.1 Competence level 1 courses apply to category 1 flight tests on:

a. helicopters certificated in accordance with the standards of CS-27 or CS-29 or equivalent airworthiness codes;

b. aeroplanes certificated in accordance with:

(i) the standards of CS-25 or equivalent airworthiness codes; or

(ii) the standards of CS-23 or equivalent airworthiness codes, within the commuter category or having an MD above 0.6 and/or a maximum ceiling above 25 000 ft.

3.2 Competence level 2 courses apply to:

a. Category 2 flight tests for:

(i) helicopters certificated in accordance with the standards of CS-27 or CS-29 or equivalent airworthiness codes;

(ii) aeroplanes certificated in accordance with:

- the standards of CS-25 or equivalent airworthiness codes; or
- the standards of CS-23 or equivalent airworthiness codes (included those mentioned in 3.1.b.(ii)), except for aeroplanes with a maximum take-off mass of less than 2 000 kg.

b. Category 1 flight tests for aeroplanes certificated in accordance with the standards of CS-23, with a maximum take-off mass of more than 2 000kg, with the exclusion of those mentioned in 3.1.b.(ii) (which are subject to competence level 1 courses).

AEROPLANES

4. Competence level 1 courses for aeroplanes.

4.1 These courses should include approximately:

a. 350 hours of ground training; and

b. 60 hours of flight training, during which at least 10 flights should be made without an FTE tutor on board (i.e. unsupervised).

c. Principles of test management and risk and safety management should be integrated throughout the course. In addition, principles and methods applicable to the certification activity, as well as safety assessments should be taught.

4.2 These courses should include instruction on at least 6 different aircraft types, of which at least 1 should be certificated in accordance with CS-25 standards or equivalent airworthiness codes.

4.3. During the course the student should be required to develop at least 5 substantial flight test reports.

4.4 The student should be evaluated through examinations on all of the theoretical knowledge subjects, and undertake a final in-flight test upon completion of the syllabus.

4.5 Syllabus. The following subjects should be covered in the course:

<table>
<tr><th colspan="3">COMPETENCE LEVEL 1 – AEROPLANES</th></tr>
<tr><td>Theoretical knowledge</td><td colspan="2">- Aerodynamics
- Stability and control / Handling qualities
- Engines and Performance
- Measurements and flight test instrumentation (including telemetry)</td></tr>
<tr><td rowspan="5">Flight test techniques and flight training:</td><td>Performance:
(at least 1 flight test report should be developed)</td><td>- Airspeed calibration
- Climb multi-engine
- Take Off and landing, including turboprop/turbofan OEI
- Level flight performance</td></tr>
<tr><td>Engines</td><td>- Turboprop/ Turbofan limitations and relight envelope</td></tr>
<tr><td>Handling qualities
(at least 2 flight test reports should be developed)</td><td>- Flight controls characteristics
- Longitudinal Handling Qualities
- Longitudinal manoeuvre stability
- Take-Off and landing multi- turboprop / turbofan, including Vmcg and Vmu
- Lateral-Directional Handling Qualities
- Handling Qualities Evaluation
- Variable stability demo flights including High Order Flight Control Systems (HOFCS)
- Stalls
- Spins
- VMCa</td></tr>
<tr><td>Systems
(at least 1 flight test report should be developed)</td><td>At least 3 different systems, for example:
- Autopilot/AFCS
- Glass cockpit evaluation
- Radio navigation, instruments qualification and integrated avionics
- EGPWS
- TCAS</td></tr>
<tr><td colspan="2">High speed certification test</td></tr>
<tr><td></td><td colspan="2">Final evaluation exercise (a flight test report should be developed)</td></tr>
</table>

5. Competence level 2 courses for aeroplanes.

5.1 These courses should include approximately:

a. 150 hours of ground training; and

b. 30 hours of flight training, during which at least 6 flights should be made without an FTE tutor on board (i.e. unsupervised).

c. Principles of test management and risk and safety management should be integrated throughout the course. In addition, principles and methods applicable to the certification activity, as well as safety assessments should be taught.

5.2 These courses should include instruction on at least 5 different aircraft types, of which at least 1 should be certificated in accordance with CS-25 standards or equivalent airworthiness codes.

5.3. During the course the student should be required to develop at least 3 substantial flight test reports.

5.4 The student should be evaluated through examinations on all of the theoretical knowledge subjects, and undertake a final in-flight test upon completion of the syllabus.

5.5 Syllabus. The following subjects should be covered in the course:

<table>
<tr><th colspan="3">COMPETENCE LEVEL 2 – AEROPLANES</th></tr>
<tr><td>Theoretical knowledge</td><td colspan="2">- Aerodynamics
- Stability and control / Handling qualities
- Engines and Performance
- Measurements and flight test instrumentation (including telemetry)</td></tr>
<tr><td rowspan="4">Flight test techniques and flight training:</td><td>Performance:
(at least 1 flight test report should be developed)</td><td>- Airspeed calibration
- Climb multi-engine
- Take Off and landing multi- Turboprop / turbofan
- Level flight performance</td></tr>
<tr><td>Handling qualities</td><td>- Flight control characteristics
- Longitudinal static / dynamic stability and control / handling qualities
- Lateral / directional stability and control / handling qualities
- Stalls
- Spins</td></tr>
<tr><td>Systems
(at least 1 flight test report should be developed)</td><td>At least 3 different systems, for example:
- Autopilot/AFCS
- Glass cockpit evaluation
- Radio navigation, instruments qualification and integrated avionics
- EGPWS
- TCAS</td></tr>
<tr><td colspan="2">Final evaluation exercise (a flight test report should be developed)</td></tr>
</table>

HELICOPTERS

6. Competence level 1 courses for helicopters:

6.1 These courses should include approximately:

a. 350 hours of ground training; and

b. 60 hours of flight training, during which at least 15 flights should be made without an FTE tutor on board (i.e. unsupervised).

c. Principles of test management and risk and safety management should be integrated throughout the course. In addition, principles and methods applicable to the certification activity, as well as safety assessments should be taught.

6.2 These courses should include instruction on at least 6 different aircraft types, of which at least 1 should be certificated in accordance with CS-29 standards or equivalent airworthiness codes.

6.3. During the course the student should be required to develop at least 5 substantial flight test reports.

6.4 The student should be evaluated through examinations on all of the theoretical knowledge subjects, and undertake a final in-flight test upon completion of the syllabus.

6.5 Syllabus. The following subjects should be covered in the course:

COMPETENCE LEVEL 1 – HELICOPTERS		
Theoretical knowledge	- Aerodynamics - Stability and control / Handling qualities - Engines and Performance - Measurements and flight test instrumentation (including telemetry)	
Flight test techniques and flight training:	Performance: (at least 1 flight test report should be developed)	- Airspeed calibration - Level flight, climb and descent, vertical and hover performance
	Engines	- Digital engine governing - Turbine / Piston engine evaluation
	Handling qualities (at least 1 flight test report should be developed)	- Flight control characteristics - Longitudinal static / dynamic stability and control / handling qualities - Lateral / directional stability and control / handling qualities - ADS 33 - Rotor assessment with different control powers - Variable stability demo flights including High Order Flight Control Systems (HOFCS)
	Systems (at least 1 flight test report should be developed)	At least 3 different systems, for example: - Navigation management systems - Auto-pilot / AFCS

		- Night vision Goggles / Electro-optics - Glass cockpit evaluation
	Height / velocity envelope and engine-off landings (EOL), including relights	
	Category A procedure	
	Vibrations and rotor adjustments	
	Auto rotations	
	Final evaluation exercise (a flight test report should be developed)	

7. Competence level 2 courses for helicopters.

7.1 These courses should include approximately:

a. 150 hours of ground training; and

b. 30 hours of flight training, during which at least 6 flights should be made without an FTE tutor on board (i.e. unsupervised);

c. Principles of test management and risk and safety management should be integrated throughout the course. In addition, principles and methods applicable to the certification activity, as well as safety assessments should be taught.

7.2 These courses should include instruction on at least 4 different aircraft types, of which at least 1 should be certificated in accordance with CS-29 standards or equivalent airworthiness codes.

7.3. During the course the student should be required to develop at least 3 substantial flight test reports should be made.

7.4 The student should be evaluated through examinations on all of the theoretical knowledge subjects, and undertake a final in-flight test upon completion of the syllabus.

7.5 Syllabus. The following subjects should be covered in the course:

COMPETENCE LEVEL 2 – HELICOPTERS		
Theoretical knowledge	- Aerodynamics - Stability and Control / Handling qualities - Engines and Performance - Measurements and flight test instrumentation (including telemetry)	
Flight test techniques and flight training:	Performance: (at least 1 flight test report should be developed)	- Airspeed calibration - Level flight, climb and descent, vertical and hover performance
	Engines	- Digital engines governing - Turbine / piston engine evaluation
	Handling qualities	- Flight control characteristics - Longitudinal static / dynamic stability and control / handling qualities - Lateral / directional stability and control / handling qualities

	Systems (at least 1 flight test report should be developed)	At least 3 different systems, for example: - Navigation management systems - Auto-pilot/AFCS - Night vision Goggles/Electro-optics - Glass cockpit evaluation
	Vibration and rotor adjustments	
	Final evaluation exercise (a flight test report should be developed)	

AMC 3 to Appendix XII

Conditions for appointment of **lead flight test engineers:**

1. Before the organisation issues an authorisation for a lead FTE, he/she should undergo an initial medical examination or assessment. Afterwards, the lead FTE should be regularly re-assessed to ensure that he/she will remain physically and mentally fit to safely discharge his/her duties. These examinations or assessments should take due account of the actual flight environment of the intended flight test activity.
2. Any medical examination or assessment should be carried out according to best aero-medical practice by a medical practitioner who has sufficient detailed knowledge of the applicant's medical history.
3. The organisation should maintain a record of medical fitness for each lead FTE.
4. These assessments should show that a lead FTE should:
   a. be in good health;
   b. be free from any physical or mental illness which might lead to incapacitation or inability to perform crew duties;
   c. have normal cardio respiratory function;
   d. have normal central nervous system;
   e. have adequate visual acuity 6/9 with or without glasses;
   f. have adequate hearing; and
   g. have normal function of ear, nose and throat.
5. If the lead FTE holds a class 1 or 2 medical certificate issued in accordance with Part-Med, the assessment is not necessary.

Appendix B - Attachments

AIRBUS PERSONNEL NPA 20.pdf

Attachment #1 to comment #127

Response to NPA 2008-20.pdf

Attachment #2 to comment #4

EASA Test Flight Thales.pdf

Attachment #3 to comment #281

Proposed_AMC_Part21AppxXII_29Jan09.pdf

Attachment #4 to comment #229

Document6.pdf

Attachment #5 to comment #252