CRD - NPA 05/2005

Comment	Response

B. Draft Decision

Paragraph ***B.1 CS-P*** **Add. info:**

Cmt. ***DGAC France***

CS-P 15 Terminology and AMC P-160 Propeller Critical Parts, paragraph (1) Remove paragraph (1) of AMC P-160 and move the following definitions in CS-P15: Approved Life Limit means the mandatory replacement life of a part which is approved by the Agency. Attributes means inherent characteristics of a finished part that determine its capability. Propeller Critical Part means a part that relies upon meeting prescribed integrity requirements to avoid primary failure, which is likely to result in a Hazardous Propeller Effect. Propeller Flight Cycle means the flight profile or combination of profiles, upon which the approved life limit is based. Primary failure means a failure of a part which is not the result of the prior failure of another part or system.	Accepted. All propeller specific definitions will be moved to CS-P 15. Any definition having a broarder scope and applicable to other CSs will be included in CS-Definitions. This accords with EASA policy on definitions.

Justification

It is easier to look for all the definitions in a unique paragraph.

Cmt. ***DGAC, France***

CS-P160 Propeller Critical Parts Integrity - Paragraph (a) (a) An Engineering Plan, the execution of which establishes and maintains that the combinations of loads, material properties, environmental influences and operating conditions, including the effects of parts influencing these parameters, are sufficiently well known or predictable, by validated analysis, test or service experience, to allow Propeller Critical Parts to be designed with a high level of integrity and/or to be withdrawn from service at an approved life limit before Hazardous Propeller Effects can occur.	Partially Accepted. The "and/or" is considered inappropriate, as all critical Parts are required to have a high level of integrity throughout their service life. Text is amended as follows: "An Engineering Plan, the execution of which establishes and maintains that the combinations of loads, material properties, environmental influences and operating conditions, including the effects of parts influencing these parameters, are sufficiently well known or predictable, by validated analysis, test or service experience, to ensure Propeller Critical Parts have a high level of integrity throughout their service life. Any Approved Life must be published as required in CS-P 40(b)"

Justification

NPA paragraph (a) apparently requires Propeller Critical Parts to be withdrawn from service at an approved life limit. But there are many examples of propeller parts, like hubs and blades, which are critical but not life limited.
Similar wording existed in JAR-P 70(e).

Comment	Response
Cmt. *MT Propeller Entwicklung GmbH* a) Feathered Pitch means the angle setting which.. B) Flight Idle typically, the lowest..minimum blade angle permitted.. C) In-Flight Low Pitch means the minimum blade angle permitted in flight d) Propeller blade angle measured in manner.. **Justification** a) Pitch is defined as distance that a propeller will move forward on one revolution, based on propeller blade angle at the blade radius station defined by the propeller manufacturer b) See a) c) See a	Not Accepted. Pitch is defined as a Propeller blade angle as defined by the applicant.

Paragraph *B.1 CS-P* **Add. info:** AMC P 160 Propeller Critical Parts,
(4) Guidance for defining an Engineering Plan
(b) Establishment of the Approved Life

Comment	Response
Cmt. *DGAC, France* It is possible that the final life calculated may be in excess of that considered likely for the associated airframe application. However, the life, in terms of cycles or hours as appropriate, should still be recorded in the Airworthiness Limitations Section in order that the usage of the part may be properly tracked. Alternatively, when the calculated life is in excess of 3 times the life of the associated airframe application, the Airworthiness Limitations Section may only require the tracking of cycles or hours as appropriate. **Justification** It would not make much sense to publish a life which would be, by example, more than 10 times the associated airframe application life. In the past, a part life estimated to be much greater than the application life was not published. In such a situation, it would be acceptable not to publish the estimated life, but to still require the tracking of the Propeller	Partially Accepted. In response to this and other comments received, the introductory text of AMC P 160 (4)(b) related to the need to track high or unlimited life parts, is removed. This aligns with current industry and certification practice. While it is considered good practice to monitor the usage of all lifed parts, especially Critical Parts, it is acknowledged that this can introduce an administrative burden without any safety benefit. However, it must be recognised that if a continued airworthiness issue develops in-service and evidence of the part's usage cannot be established accurately, then replacement of all such parts within the fleet may be necessary.

Paragraph *B.1 CS-P* **Add. info:** AMC P 220 (2)

Comment	Response
Cmt. *MT Propeller Entwicklung GmbH* Omit the following from AMC P 220 (2): These should be listed in the Instructions for Propeller Installation and Operation. **Justification** The feathering and unfeathering characteristics and limitations with parameters such as Feather angle, rate of Pitch change, and airspeed limits above the propeller may not feather completely or Feather at a slower rate will be issued in the AFM or AFMS. Most of the propeller manufacturers use one general Propeller Installation and Operation Manual for a varity of propellers, e.g. all hydraulic constant speed propellers. It is absolutely impossible to list these values for each propeller installation in the Propeller Installation and Operation Manual and to issue new revision every time a new STC has been made. The requested parameters depend on the propeller/engine/airframe combination and every propeller/engine/airframe combination cannot be listed in the Propeller Installation and Operation Manual. Sometimes you can have more than 100 possibilities.	Partially Accepted. The data requested is considered to be both relevant and appropriate to ensure the necessary interface between Propeller and Airframe TC holders. The Installation manual is also considerd to be the appropriate place to record such information. However, this is only one means of compliance, and other means may be acceptable provided the information is readily available to the airframe TC holder. To clarify this, "These should be listed in the Instructions for Propeller Installation and Operation." is replaced by "Such data should be made available to airframe TC holders, as necessary" There may also be some confussion as to the nature and intended recipient of the Installation Manual, and so clarification is given by including the following sentence in AMC P 30(a): (1) The installation manual is provided as an interface document between Propeller and Aircraft/Engine TC holders.

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** AMC P 220(2)

Cmt. ***Avia Propeller Ltd***

Omit the following from AMC P 220 (2): These should be listed in the Instructions for Propeller Installation and Operation.	Partially Accepted. The data requested is considered to be both relevant and appropriate to ensure the necessary interface between Propeller and Airframe TC holders. The Installation manual is also considerd to be the appropriate place to record such information. However, this is only one means of compliance, and other means may be acceptable provided the information is readily available to the airframe TC holder. To clarify this, "These should be listed in the Instructions for Propeller Installation and Operation." is replaced by "Such data should be made available to airframe TC holders, as necessary" There may also be some confussion as to the nature and intended recipient of the Installation Manual, and so clarification is given by including the following sentence in AMC P 30(a): (1) The installation manual is provided as an interface document between Propeller and Aircraft/Engine TC holders.

Justification

The feathering and unfeathering characteristics and limitations with parameters such as Feather angle, rate of Pitch change, and airspeed limits above the propeller may not feather completely or Feather at a slower rate will be issued in the AFM or AFMS.
Most of the propeller manufacturers use one general Propeller Installation and Operation Manual for a variaty of propellers, e.g. all hydraulic constant speed propellers. It is absolutely impossible to list these values for each propeller installation in the Propeller Installation and Operation Manual and to issue new revision every time a new STC has been made.
The requested parameters depend on the propeller/engine/airframe combination and every propeller/engine/airframe combination cannot be listed in the Propeller Installation and Operation Manual. Sometimes there can be more than 100 possibilities.

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** AMC P 30

Comment	Response
Cmt. *Avia Propeller Ltd* Omit the following from AMC P 30(a)(2): Propeller properties and limitations Propeller shaft loads Vibration environment Altitude versus ambient temperature limitations Propeller system component weights Moment of inertia Center of gravity List weights Pitch change Settings Pitch change rate Beta sensor position Limit on intended movement below the In-Flight Low-Pitch-Position Feathering limitations and minimum declared temperature Electrical System description Qualification results Assumptions Safety Analysis Design Operation	Not Accepted. The list of contents in AMC P 30(a) is that typically found in an installation manual of a Feathering and reversing propeller. The list should be viewed as a guide to compiling an installation manual and not all items will be applicable to all types of propellers. Additional text is added to AMC P 30(a)(3) to clarify this. The comment suggests that there is some misunderstanding regarding the intended recipient of the installation manual. Clarification is given by incuding the following sentence within AMC P 30(a): "(1) The installation manual is provided as an interface document between Propeller and Aircraft/Engine TC holders. "
Justification All above mentioned topics are only of interest for the airplane manufacturers and they work directly together with the propeller manufacturer and will get the required information when needed. The CS-P 30 and AMC P 30 in the present issue will work well if you have just one or two propellers for one or two airplanes but it is absolutely unpractical and out of touch with reality for e.g. propeller manufacturers with more than 20 propeller types with each up to 35 different possible blade types and diameters from 140 cm to 270 cm which can be used on different airplanes. e.g. some of them have about 70 !!! STCs (Propeller installations on airplanes) and gets about 6-8 STC per year! Most of the propeller manufacturers use one general Propeller Installation and Operation Manual for a variaty of propellers, e.g. all hydraulic constant speed propellers. It is absolutely impracticable to list all the items (characteristics and limitations and so on) for each installation in the Propeller Installation and Operation Manual and to issue new revision every time a new STC has been made. It is very important to support the needs of the European industry, incl. General Aviation and not to get lost in the bureaucratic machinery. There is no demand for theoretical considerations. A more practicable way of thinking is required. Specific information as the following will be issued in the airplane TCDS, Airplane Flight Manual or Airplane Flight Manual Supplement and has no place in the Instructions for Propeller Installation and Operation because they will vary from airplane type to type. Vibration environment, Altitude versus ambient temperature limitations, Pitch Settings Beta sensor position (Beta pick-up angle), Limit on intended movement below the In-Flight Low-Pitch-Position, Feathering limitations and minimum declared temperature. A propeller does not have any vibrations without an engine and also no noise emission without an engine!	

Comment	Response
Nobody is interested in assumptions about safety analysis, design and operation. It is absolutely unnecessary and creates workload only. Why is the agency interested to have these assumptions in the Instructions for Propeller Installation and Operation? No practicable background can be found. AMC-P30(a)(2) General: CS-P 30 and AMC P 30 are too extensive, not practicable for propeller manufactures with e.g. more than 20 propeller types with each up to 35 different possible blade types and diameters from 140 cm to 270 cm and continuously develop new propeller and propeller blades for new or existing applications. CS-P 30 and AMC P 30 were probably developed on basis of information from propeller manufactures which have only a small variaty of propeller types e.g. one propeller with one TCDS on one aircraft. The CS-P 30 and AMC P 30 shall be changed to be more practicable and shall not be a work load-generating measures for the industry. Operation and Installation Manuals shall be practicable and shall only include short and brief information which are really needed. There is no demand for theoretical considerations. Creating 1000 of pages and nobody in the field is interested in reading. That is not the object of the Operation and Installation Manuals.	

Comment	Response

Paragraph ***B.1 CS-P*** **Add. info:** AMC P 30, A-1-MTP-AMC-P30(a)(2)

Comment	Response
Cmt. *MT Propeller Entwicklung GmbH* Omit the following from AMC P 30(a)(2): Propeller properties and limitations Propeller shaft loads Vibration enviroment Altitude versus ambient temperature limitations Propeller system component weights Moment of inertia Center of gravity List weights Pitch change Settings Pitch change rate Beta sensor position Limit on intended movement below the In-Flight Low-Pitch-Position Feathering limitations and minimum declared temperature Electrical System description Qualification results Assumptions Safety Analysis Design Operation	Not Accepted. The list of contents in AMC P 30(a) is that typically found in an installation manual of a Feathering and reversing propeller. The list should be viewed as a guide to compiling an installation manual and not all items will be applicable to all types of propellers. Additional text is added to AMC P 30(a)(3) to clarify this. The comment suggests that there is some misunderstanding regarding the intended recipient of the installation manual. Clarification is given by incuding the following sentence within AMC P 30(a): "(1) The installation manual is provided as an interface document between Propeller and Aircraft/Engine TC holders. "
Justification All above mentioned topics are only of interest for the airplane manufacturers and they work directly together with the propeller manufacturer and will get the required information when needed. The CS-P 30 and AMC P 30 in the present issue will work well if you have just one or two propeller for one or two airplanes but it is absolutely unpractical and out of touch with reality for e.g. propeller manufactuers with more than 20 propeller types with each up to 35 different possible blade types and diameters from 140 cm to 270 cm which can be used on different airplanes. e.g. some of them have about 70 !!! STCs (Propeller installations on airplanes) and gets about 6-8 STC per year! Most of the propeller manufacturers use one general Propeller Installation and Operation Manual for a varity of propellers, e.g. all hydraulic constant speed propellers.It is absulotely impracticable to list all the items (characteristics and limitations and so on) for each installation in the Propeller Installation and Operation Manual and to issue new revision every time a new STC has been made. It is very important to support the needs of the european industry incl. General Aviation and not to get lost in the bureaucratic machinery. There is no demand for theoretical considerations. A more practicable way of thinking is required. Specific informations as the following will be issued in the airplane TCDS, Airplane Flight Manual or Airplane Flight Manual Supplement and has no place in the Instructions for Propeller Installation and Operation because they will vary from airplane type to type. Vibration enviroment, Altitude versus ambient temperature limitations, Pitch Settings Beta sensor position (Beta pick-up angle), Limit on intended movement below the In-Flight Low-Pitch-Position, Feathering limitations and minimum declared temperature. A propeller does not have any vibrations without an engine and also no noise emission without an engine!	

Comment	Response
Nobody is interested in assumptions about safety analysis, design and operation. It is absolutely unnecessary and creates workload only. Why is the agency interested to have these assumptions in the Instructions for Propeller Installation and Operation? No practicable background can be found. General: CS-P 30 and AMC P 30 are too extensive, not practicable for propeller manufactures with e.g. more than 20 propeller types with each up to 35 different possible blade types and diameters from 140 cm to 270 cm and continuously develop new propeller and propeller blades for new or existing applications. CS-P 30 and AMC P 30 were probably delevoped on basis of informations from propeller manufactures which have only a small variaty of propeller types e.g. one propeller with one TCDS on one aircraft. The CS-P 30 and AMC P 30 shall be changed to be more practicable and shall not be a work load-generating measures for the industry. Operation and Installation Manuals shall be practicable and shall only enclude short and brief informations which are really needed. There is no demand for theoretical considerations. Creating 1000 of pages and nobody in the field is interested in reading. That is not the object of the Operation and Installation Manuals.	

Paragraph ***B.1 CS-P*** **Add. info:** AMC P 390

Cmt. ***Avia Propeller Ltd***

Omit the complete AMC P 390 (3)	Not Accepted It is fundamental in performing the endurance test that the test conditions are established to be representative of the intended application. The test should therefore be conducted with all components installed and with an engine capable of developing the necessary power and torque levels, shaft speed and vibratory characteristics. There are significant variations in engine output torque and vibration depending on the type of engine used and hence an unrepresentative engine would invalidate the test.

Justification

The main load is created by bending moments and centrifugal force and CF depends directly on RPM. Therefore it does not make any difference which engine is used. Vibration is part of CS-P 350 and CS 23.907 and engine vibration has no place in AMC P 390.

Paragraph ***B.1 CS-P*** **Add. info:** AMC P160 (4) Critical Parts

Cmt. ***GAMA***

Comment concerning the phrase: 'However, the life, in terms of cycles or hours as appropriate, should still be recorded in the Airworthiness Limitations Section in order that the usage of the part may be properly tracked.'	Partially Accepted. In response to this and other comments received, the introductory text of AMC P 160 (4)(b) related to the need to track high or unlimited life parts, is removed. While it is considered good practice to monitor the usage of all lifed parts, especially Critical Parts, it is acknowledged that this can introduce an administrative burden without any safety benefit. However, it must be recognised that if a continued airworthiness issue develops in-service and evidence of the part's usage cannot be established accurately, then replacement of all such parts within the fleet may be necessary.

Justification

It may not be appropriate to declare a life in terms of cycles or hours for all critical components. Rather, it may be more appropriate to declare a maintenance or operational condition that determines when the component is to be retired from service. Your objective of tracking the components service time can still apply regardless of a requirement to specify a life in terms of cycles or hours.

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** AMC P390

Cmt. *MT Propeller Entwicklung GmbH*

Omit the complete AMC P 390 (3)	Not Accepted It is fundamental in performing the endurance test that the test conditions are established to be representative of the intended application. The test should therefore be conducted with all components installed and with an engine capable of developing the necessary power and torque levels, shaft speed and vibratory characteristics. There are significant variations in engine output torque and vibration depending on the type of engine used and hence an unrepresentative engine would invalidate the test

Justification

The main load is created by bending moments and centrifugal force and CF depends directly on RPM. Therefore it does not make any difference which engine is used. Vibration is part of CS-P 350 and CS 23.907 and engine vibration has no place in AMC P 390!!!!

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 160 Propeller Critical Parts
(4) (b)

Cmt. *FAA, USA*

(4)(b) Establishment of the Approved Life << It is possible that the final life calculated may be in excess of that considered likely for the associated airframe application. However, the life, in terms of cycles or hours as appropriate, should still be recorded in the Airworthiness Limitations Section in order that the usage of the part may be properly tracked.>> <<DELETE>>	Accepted.

Justification

Many Propeller Critical Parts are designed for unlimited life and therefore no life limit is needed. Many of these parts are designed using safe life methods and have stress levels below the endurance limit of the material. This section should be deleted.

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 350 Centrifugal Load Tests
(5)

Cmt. *FAA, USA*

<<(5) Additional Substantiation of Composite Blades, Spinners and Components attached to composite Blade features, such as those associated with transitions from composite blade to the metallic retention, can be tested during the hub and retention test required by CS-P 350 or with a separate component test. There may be other applicable configurations, such as the transition associated with a configuration in which the blade of any material construction is bonded or otherwise attached to the portion of the blade that is retained to the hub.>> <<DELETE>>	Accepted.

Justification

The paragraph is a repeat of paragraph (3) and therefore should be deleted.

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 370 Fatigue Characteristics
(5)

Cmt. *FAA, USA*

(5) Fatigue characteristics may include other methods such as damage tolerance agreed upon by the Agency.	Partially Accepted. While the intent of the comment is accepted, the proposed text is modified as follows: "Damage Tolerance methodology can be used as an alternative to the establishment of an Approved Life, if agreed by the Agency"
Justification	
Add a paragraph to permit methods of compliance other than safe-life.	

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 390 Endurance Tests
(5)

Cmt. *FAA, USA*

(5) Stops <<DELETE>><<(Ground Tests)>>. Each period should be run non-stop. In the event of a stop occurring during any period, the period should be repeated unless the Agency considers this to be unnecessary. The Agency reserves the right to require the complete test to be repeated if an excessive number of stops occurs.	Accepted.
Justification	
There is no specific ground test in the specification. Therefore, delete (Ground Test).	

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 420 Components of the Propeller Control System

Cmt. *FAA, USA*

This requirement is intended to identify functionality and wear of the Propeller Pitch Control Systems components for the purpose of establishing appropriate instructions for continued airworthiness. This test may be performed in conjunction with the CS-P 400, Functional Test.	Partially Accepted. The word "test" is removed as compliance with CS-P 400 may be shown through analysis. The text of AMC P 420 now reads as follows: This requirement is intended to identify functionality and wear of the Propeller Pitch Control Systems components for the purpose of establishing appropriate instructions for continued airworthiness. This may be performed in conjunction with the CS-P 400, Functional Test.
Justification	
The test cycles from the functional test are applicable to CS-P 420.	

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 530 Vibration and Aeroelastic Effects
(1)

Cmt. *FAA, USA*

(1) Propellers with Detachable Metal, <<DELETE> <<or>> Composite, or Wood Blades	Partially Accepted. There is no justification for applying this paragraph to only detachable blades. The paragraph has therefore been re-organised by deleting sub-paragraph (2) and making it applicable to all propellers. AMC P 530 now reads as follows: "AMC P 530 Vibration and Aeroelastic Effects If a test is to be conducted for compliance with CS-P 530, then: (a) The disposition … (b) The survey should …"
Justification	
These tests are applicable to detachable wood blades.	

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 530 Vibration and Aeroelastic Effects
(2)

Cmt. *FAA, USA*

<<DELETE>> <<(2) Propellers with Detachable Wooden Blades A test should be conducted on prototype Propellers to determine that the vibration characteristics are not such as to cause resonance detrimental to airworthiness throughout the whole range of engine speeds.>>	Accepted.
Justification	
These tests are applicable to detachable wood blades. Delete paragraph (2).	

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 550 Fatigue Evaluation
(6)

Cmt. *FAA, USA*

(6) Fatigue evaluation may include other methods such as damage tolerance agreed upon by the Agency.	Partially Accepted. While the intent of the comment is accepted, the proposed text is modified as follows: "Damage Tolerance methodology can be used as an alternative to the establishment of an Approved Life, if agreed by the Agency"
Justification	
Add a paragraph to permit methods of compliance other than safe-life.	

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) - Book 2
AMC P 560 Flight Functional Tests

Cmt. *FAA, USA*

Compliance with CS-P 560 may be shown by flight testing or service history as agreed by the Agency.	Partially Accepted. AMC P 560 Flight Functional Tests is to read as follows: "Compliance with CS-P 560 may be shown by flight testing or service history such as documented approval for use on an aeroplane Type Certificate Data Sheet"

Justification

Add a section to permit methods of compliance based on documented flight testing and service history such as documented approval for use on an airplane type certificate data sheet .

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) Book 1

CS-P 15 Terminology

Cmt. *FAA, USA*

Maximum Propeller Over-speed means the transient maximum propeller speed demonstrated in CS-P 410	Not Accepted. This term is defined in CS-Definitions as follows: 'Maximum Propeller Overspeed' (20 second) means the maximum propeller rotational speed, inadvertent occurrence of which for periods of up to 20 seconds, has been agreed not to require rejection of the propeller from service or maintenance action (other than to correct the cause).

Justification

Definition added to clarify CS-P 410.

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) Book 1
CS-P 15 Terminology

Cmt. *FAA, USA*

Feathered Pitch means the Pitch setting, specified in the propeller installation manual, which in flight corresponds with a windmilling torque of approximately zero and approximately zero rotational speed.	Partially Accepted. It is appropriate to limit the definition of "feathered pitch" to its physical properties only. How and where the pitch is recorded is dealt with elsewhere. The adopted text therefore reads: Feathered Pitch means the Pitch setting which in flight corresponds with a windmilling torque of approximately zero and approximately zero rotational speed

Justification

The change is proposed because a feather propeller does not always provide minimum drag. When the propeller is feathered the windmilling torque is near zero and the rotational speed is near zero. Also, the phrase "engine stopped" was deleted because a propeller can be feathered on a running free turbine engine.

Cmt. *FAA, USA*

Propeller Critical Part means a part that relies upon meeting prescribed integrity requirements to avoid Primary Failure, which is likely to result in a Hazardous Propeller Effect.	Partially Accepted. The adopted definition is based on that extracted from CS-E and reads as follows: Propeller Critical Part means a part that relies upon meeting the prescribed integrity specifications of CS-P 160 to avoid its Primary Failure which could result in a Hazardous Propeller Effect

Justification

Propeller Critical Part should be defined.

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) Book 1
CS-P 150 Propeller Safety Analysis
(c)

Cmt. *FAA, USA*

(c) It is recognized that the probability of primary failures of certain single elements (for example, hubs and blades) cannot be sensibly estimated in numerical terms. If the failure of such elements is likely to result in Hazardous Propeller Effects, they will be identified as Propeller Critical Parts and reliance must be placed on meeting the prescribed integrity requirements of CS-P 160 << in order to support the objective of an extremely remote probability of failure.>> << DELETE>> These instances shall be stated in the safety analysis.	Accepted.

Justification

The proposal is advisory and should be deleted.

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) Book 1
CS-P 150 Propeller Safety Analysis
(e) (1)

Cmt. *FAA, USA*

(e) If the acceptability of the safety analysis is dependent on one or more of the following, it shall be identified in the analysis and appropriately substantiated. (1) <<Mandatory>> Maintenance actions <<required for certification or other maintenance action performed>> being carried out at stated intervals. This includes the verification of the serviceability of items which could fail in a latent dormant manner. <<When necessary for preventing the occurrence of Hazardous Propeller Effects at a rate in excess of Extremely Remote, ...>> <<DELETE>>	Partially Accepted. While probabalistic methods are inappropriate for certain structural components, they are relevant in the case of systems. There is a need to determine the presence of system dormant failures, which in combination with a second failure, could lead to a Hazardous Propeller Effect occurring at a rate in excess of Extremely Remote, and it is appropriate that the approved period stipulated between maintenance actions is written in the Airworthiness Limitation Section of the Instructions for Continued Airworthiness. The text has therefore been amended to clarify this issue as follows: (e) If the acceptability of the safety analysis is dependent on one or more of the following, it shall be identified in the analysis and appropriately substantiated. (1) Maintenance actions being carried out at stated intervals. This includes the verification of the serviceability of items which could fail in a dormant manner. Maintenance actions to verify the absence of dormant failures which could, in combination with another failure, lead to Hazardous Propeller Effects at a rate in excess of Extremely Remote, must be published in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required under CS-P 40. If errors in maintenance of the Propeller system, could lead to Hazardous Propeller Effects, appropriate procedures must be included in the relevant Propeller manual(s).

Justification

The proposal is in conflict with CS-P 150 (c) that states "certain single elements (for example, hubs and blades) cannot be sensibly estimated in numerical terms". Therefore, the proposal should be deleted.

Comment	Response
Cmt. *FAA, USA* (e) (1) ...<<These the maintenance intervals must be published in the appropriate manual(s) the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required under CS-P 40. These maintenance intervals must be published in the appropriate manual(s). .....>> << DELETE >> **Justification** The original text should be restored as shown. The proposed text would require that maintenance such as daily, annual, major inspection, overhaul, and painting be put in the airworthiness limitations section as needed. For example, propeller blades are critical parts. Therefore, all maintenance of the propeller blades that prevents failure would now need to be included in the airworthiness limitations section. The propeller blades are exposed to these environmental effects such as stone nicks and therefore would need to be protected by daily mandatory maintenance to comply with CS-P 150. This is not feasible. The proposal should be deleted.	Partially Accepted While probabalistic methods are inappropriate for certain structural components, they are relevant in the case of systems. There is a need to determine the presence of system dormant failures, which in combination with a second failure, could lead to a Hazardous Propeller Effect occurring at a rate in excess of Extremely Remote, and it is appropriate that the approved period stipulated between maintenance actions is written in the Airworthiness Limitation Section of the Instructions for Continued Airworthiness. The text has therefore been amended to clarify this issue as follows: (e) If the acceptability of the safety analysis is dependent on one or more of the following, it shall be identified in the analysis and appropriately substantiated. (1) Maintenance actions being carried out at stated intervals. This includes the verification of the serviceability of items which could fail in a dormant manner. Maintenance actions to verify the absence of dormant failures which could, in combination with another failure, lead to Hazardous Propeller Effects at a rate in excess of Extremely Remote, must be published in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required under CS-P 40. If errors in maintenance of the Propeller system, could lead to Hazardous Propeller Effects, appropriate procedures must be included in the relevant Propeller manual(s).
Cmt. *FAA, USA* (e) (1) <<Additional>>, If errors in maintenance of the Propeller system, <<including the control system>> , could lead to Hazardous Propeller Effects, appropriate procedures must be included in the relevant Propeller manual(s). <<DELETE>> **Justification** When the propeller control system is not part of the propeller type design the propeller type certificate holder cannot assess errors in maintenance. The proposed text "including the control system" should be deleted. The original text only applied to the Propeller because system was not capitalized. Therefore deleting system does not change the requirement.	Accepted.

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) Book 1
CS-P 160 Propeller Critical Parts Integrity
(a)

Cmt. *FAA, USA* (a) An Engineering Plan, the execution of which establishes and maintains that the combinations of loads, material properties, environmental influences and operating conditions, including the effects of parts influencing these parameters, are sufficiently well known or predictable, by validated analysis, test or service experience, to allow Propeller Critical Parts to be withdrawn from service << DELETE>> <<at an approved life limit >> before Hazardous Propeller Effects can occur. Any approved life limits must be published as required in CS-P 40(b) **Justification** Delete the phrase "at an approved life limit". Most propeller blades and hubs are designed for unlimited life. Including the phrase "at an approved life limit" now requires that a life	Partially Accepted While the intent of the comment is understood and accepted, different text is adopted as a result of consideration of this and other comments received. The revised text of CS-P 160(a) is believed to offer a more objective statement and now reads as follows: (a) An Engineering Plan, the execution of which establishes and maintains that the combinations of loads, material properties, environmental influences and operating conditions, including the effects of parts influencing these parameters, are sufficiently well known or predictable, by validated analysis, test or service experience, to ensure Propeller Critical Parts have a high level of integrity throughout their service life. Any Approved Life must be published as required in CS-P 40(b).

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** B.1 Certification Specification for Propellers (CS-P) Book 1
CS-P 40 Instructions for Continued Airworthiness
(b)

Cmt. *FAA, USA*

(b) The instructions for continued airworthiness must contain a section titled airworthiness limitations that is segregated and clearly distinguishable from the rest of the document(s). This section must set forth each mandatory replacement time, inspection interval and related procedure required for type certification. <<For Propeller Critical Parts, this section must also include any mandatory action or limitation for in-service maintenance and repair identified in the Service Management Plan, as required under CS-P 160(c).>> << DELETE >>	Accepted.

Justification

The rule already specifies that mandatory replacement time, inspection interval and related procedures are set forth. Adding an additional sentence for critical parts implies that these mandatory actions are in some way different. Therefore, the proposal should be deleted.

Paragraph *B.1 CS-P* **Add. info:** CS P 15

Cmt. *Avia Propeller Ltd*

a) Feathered Pitch means the Pitch angle setting which.. B) Flight Idle typically, the lowest..minimum blade angle pitch position permitted.. c) In-Flight Low Pitch means the minimum blade angle pitch permitted in flight d) Pitch Propeller blade angle means the Propeller blade angle, measured in manner…	Not Accepted. Pitch is defined as a Propeller blade angle as defined by the applicant.

Justification

a) Pitch is defined as distance that a propeller will move forward on one revolution, based on propeller blade angle at the blade radius station defined by the propeller manufacturer
b) See a)
c) See a

Paragraph *B.1 CS-P* **Add. info:** CS P 220(d)

Cmt. *Avia Propeller Ltd*

Omit the following from CS-P 220 (d): ..the Propeller type certificate data sheet.... Change it to ... the Airplane Flight Manual or Airplane Flight Manual Supplement must be endorsed accordingly.	Not Accepted. This comment does not relate to any proposal within NPA 05/2005. However, not withstanding this, CS-P Subpart D, unlike FAR Part 35, addresses engine/propeller combinations. Operating limitations will therfore be determined as part of the Propeller Type Design approval and it is therefore appropriate that such limits are recorded in the Propeller TCDS. Some designs also include a centrifugal lock as an integral part of the propeller to restrict blade feathering at low speed and their operation is entirely a function of rotational speed and not of any individual engine type.

Justification

The minimum engine/propeller rotational speed below which propeller feathering cannot be accomplished depends on the engine (e.g. Lycoming, TCM, Rotax, Thielert, PT6, Garrett, Allison,...) and will determine during flight testing. It varies from project to project. At the end the AFM or AFMS will be endorsed accordingly. You cannot change the Propeller TCDS every time you make a new STC.
If you have a look at the existing Propeller TCDS and Airplane TCDS (FAA, LBA, EASA) you

Comment	Response
Paragraph *B.1 CS-P* **Add. info:** CS-P 140(b) **Cmt.** *GAMA* Delete the phrase: 'For Propeller Critical Parts, this section must be also include any mandatory action or limitation for in-service maintenance and repair identified in the Service Management Plan, as required under CS-P 160(c).' **Justification** This phrase appears redundant to the existing text under CS-P 40.	Accepted.
Paragraph *B.1 CS-P* **Add. info:** CS-P 15 **Cmt.** *GAMA* Feathered Pitch means the Pitch setting that produces minimum windmilling torque when the engine is powered off. **Justification** Neither aircraft nor propeller manufacturers demonstrate that the feathered pitch setting produces minimum drag; although the drag in the feathered position is generally very low. What we believe is more normal is to determine the pitch setting where engine rotational speed is negligible when the engine is powered off.	Partially Accepted. Further clarification is given in the adopted text, which reads as follows: "Feathered Pitch means the Pitch setting which in flight corresponds with a windmilling torque of approximately zero and approximately zero rotational speed"
Cmt. *GAMA* Critical Part A part that relies upon meeting prescribed integrity requirements to avoid primary failure, which is likely to result in a Hazardous Propeller Effect. **Justification** The term 'Critical Parts', is in capital letters therefore indicating it is an official term. There is also a regulation title 'Critical Parts' (CS-P 160). However, the definition of a critical part is unclear. It appears a definition for a critical part is provided in AMC P 160. That definition, or a similar definition, should be placed into the terminology section.	Partially Accepted. A definition of Propeller Critical Part is introduced into CS-P 15 Terminology to read as follows: "Propeller Critical Part means a part that relies upon meeting the prescribed integrity specifications of CS-P 160 to avoid its Primary Failure which could result in a Hazardous Propeller Effect"
Cmt. *GAMA* Maximum Propeller Over-speed means the transient maximum propeller rotational speed demonstrated in CS-P410 **Justification** A definition for 'Maximum Propeller Over-speed' should be provided for consistency, since there is already a definition for 'Maximum Propeller Over-torque'.	Not Accepted. This term is defined in CS-Definitions as follows: 'Maximum Propeller Overspeed' (20 second) means the maximum propeller rotational speed, inadvertent occurrence of which for periods of up to 20 seconds, has been agreed not to require rejection of the propeller from service or maintenance action (other than to correct the cause).

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** CS-P 150 (e) (1) Propeller Safety Analysis

Cmt. *GAMA*

Concerning the phrase: 'When necessary for preventing the occurrence of Hazardous Propeller Effects at a rate in excess of Extremely Remote, the maintenance intervals must be published in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required under CS-P 40.' The sentence should be changed as it could have significant consequences for operators.	Partially Accepted While probabalistic methods are inappropriate for certain structural components, they are relevant in the case of systems. There is a need to determine the presence of system dormant failures, which in combination with a second failure, could lead to a Hazardous Propeller Effect occurring at a rate in excess of Extremely Remote, and it is appropriate that the approved period stipulated between maintenance actions is written in the Airworthiness Limitation Section of the Instructions for Continued Airworthiness. The text has therefore been amended to clarify this issue as follows: (e) If the acceptability of the safety analysis is dependent on one or more of the following, it shall be identified in the analysis and appropriately substantiated. (1) Maintenance actions being carried out at stated intervals. This includes the verification of the serviceability of items which could fail in a dormant manner. Maintenance actions to verify the absence of dormant failures which could, in combination with another failure, lead to Hazardous Propeller Effects at a rate in excess of Extremely Remote, must be published in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required under CS-P 40. If errors in maintenance of the Propeller system, could lead to Hazardous Propeller Effects, appropriate procedures must be included in the relevant Propeller manual(s).

Justification

We want to be sure you understand the implications of this phrase. This phrase will effectively require overhauls to be performed on the propeller hub and blades (and other critical parts). Carrying this to the extreme, this phrase may even require pre-flight inspections to be referenced in the ALS, that look for damage such as stone nicks, because such maintenance may be required to prevent a hazardous propeller effect. If a pre-flight inspection were referenced in the ALS, the pilot would not be authorized to perform the inspection; rather, we believe it would then rise to the level where an inspector would be required.

Cmt. *GAMA*

Delete the phrase 'including the control system'.	Accepted.

Justification

The propeller manufacturer cannot provide maintenance instructions for control system components that are not part of that manufacturer's propeller Type Design. If the propeller manufacturer does produce the propeller control system components under his Type Certificate, then those components are included in the term 'Propeller', and need no separate reference.

Paragraph *B.1 CS-P* **Add. info:** CS-P 160(a)

Cmt. *GAMA*

Delete the phrase 'at an approved life limit'	Partially Accepted. While the intent of the comment is understood and accepted, different text is adopted as a result of consideration of this and other comments received. The revised text of CS-P 160(a) is believed to offer a more objective statement and now reads as follows: (a) An Engineering Plan, the execution of which establishes and maintains that the combinations of loads, material properties, environmental influences and operating conditions, including the effects of parts influencing these parameters, are sufficiently well known or predictable, by validated analysis, test or service experience, to ensure Propeller Critical Parts have a high level of integrity throughout their service life. Any Approved Life must be published as required in CS-P 40(b).

Justification

It is possible that critical components may be retired from service, not due to a life limit, but instead to a service condition. The phrase 'at an approved life limit' implies there must be a stated life, expressed in flight-hours, which might not always be the case.

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** CS-P 220(d)

Cmt. ***MT Propeller Entwicklung GmbH***

Omit the following from CS-P 220 (d): ..the Propeller type certificate data sheet.... Change it to ... the Airplane Flight Manual or Airplane Flight Manual Supplement must be endorsed accordingly.	Not Accepted. This comment does not relate to any proposal within NPA 05/2005. However, not withstanding this, CS-P Subpart D, unlike FAR Part 35, addresses engine/propeller combinations. Operating limitations will therfore be determined as part of the Propeller Type Design approval and it is therefore appropriate that such limits are recorded in the Propeller TCDS. Some designs also include a centrifugal lock as an integral part of the propeller to restrict blade feathering at low speed and their operation is entirely a function of rotational speed and not of any individual engine type.

Justification

The minimum engine/propeller rotational speed below which propeller feathering cannot be accomplished depends on the engine (e.g. Lycoming, TCM, Rotax, Thielert, PT6, Garrett, Allison,...) and will determine during flight testing. It varies from project to project. At the end the AFM or AFMS will be endorsed accordingly. You cannot change the Propeller TCDS very time you make a new STC.
If you have a look at the existing Propeller TCDS and Airplane TCDS (FAA, LBA, EASA) you

Paragraph *B.1 CS-P* **Add. info:** CS-P 30(a)

Cmt. ***MT Propeller Entwicklung GmbH***

Omit the following from CS-P 30(a): Complete (6)	Not Accepted. This comment does not relate to any proposal within NPA 05/2005. However, not withstanding this, the need to record assumptions made in the design and certification of a Propeller is considered essential to assess the Propeller's acceptability for installation on an aircraft and for continued airworthiness. Approved Life, for example, is determined based on certain assumptions regarding an aircrafts flight profile. If the aircraft were to operate outside of these assumptions, the Approved Life may be invalid leading to a potentially unsafe condition.

Justification

(6) Nobody is interested in assumptions about safety analysis, design and operation. It is absolutely unnecessary and creates workload only. It is without any informative background.

Cmt. ***Avia Propeller Ltd***

Omit the following from CS-P 30(a): Complete (6)	Not Accepted. This comment does not relate to any proposal within NPA 05/2005. However, not withstanding this, the need to record assumptions made in the design and certification of a Propeller is considered essential to assess the Propeller's acceptability for installation on an aircraft and for continued airworthiness. Approved Life, for example, is determined based on certain assumptions regarding an aircrafts flight profile. If the aircraft were to operate outside of these assumptions, the Approved Life may be invalid leading to a potentially unsafe condition.

Justification

(6) Nobody is interested in assumptions about safety analysis, design and operation. It is absolutely unnecessary and creates workload only. It is without any informative background.

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** SUPPART A – GENERAL
CS-P Terminology
Para. (b) General definitions

Cmt. ***Hamilton Sundstrand Corporation***

Add definition for Propeller Critical Part as follows: Propeller Critical Part: A part that relies upon meeting prescribed integrity requirements to avoid primary failure, which could result in a Hazardous Propeller Effect.	Partially Accepted. A definition of Propeller Critical Part is introduced into CS-P 15 Terminology to read as follows: Propeller Critical Part means a part that relies upon meeting the prescribed integrity specifications of CS-P 160 to avoid its Primary Failure which could result in a Hazardous Propeller Effect.

Justification

This terminology is defined in AMC-160 and it is stated that the definition applies to CS-P 160 thus the definition should be brought forward and included in the general definitions applicable for the document. An acceptable alternative would be to provide the location of the current general definition of a Critical Part in the general definition

Paragraph *B.1 CS-P* **Add. info:** SUPPART B – DESIGN AND CONSTRUCTION
AMC P 160 Propeller Critical Parts
Para. (3) General
Sub para. (a)

Cmt. ***Hamilton Sundstrand Corporation***

Third sentence to be changed as follows: If a part is made of various sub-parts whose proper function is required for the part to function properly and any one of the sub-parts is identified as a Propeller Critical Part, the entire part is then treated as a Propeller Critical Part.	Not Accepted Under such a definition the whole Propeller would become a Critical Part. The existing definition identifies a Critical Part as having potentially Hazardous Propeller Effects, and these will remain irrespective of the part being subsequently installed in an assembly. The benefit of the Critical Part procedures, and the need for special treatment and care, will be lost if too many parts are identified as such.

Justification

If an assembly of sub-parts provides one or more functions on the aircraft as a uniquely identified assembly and the assembly is recognized as a unique part, then the assembly should be classified as a Critical Part. The sub-part should also be a Critical Part if the sub-part functional failure can create a hazardous condition at the assembly level. This

Paragraph *B.1 CS-P* **Add. info:** SUPPART B – DESIGN AND CONSTRUCTION
AMC-P 160 Propeller Critical Parts
Para. (1)

Cmt. ***Hamilton Sundstrand Corporation***

In third sentence change “is likely to” to “could”	Accepted.

Justification

Classification of a propeller part as critical should be made based on the consequence of failure to function as designed when used as intended not on the likelihood that a hazardous condition could occur when the product fails. The phrase “is likely to,” allows a decision that the hazardous consequence is an unlikely result of the failure and the part might not be identified as a Propeller Critical Part even though its failure could create a hazardous condition. It could also lead to disagreement as to what fraction of failure consequences constitutes unlikely.

Comment	Response

Paragraph *B.1 CS-P* **Add. info:** SUPPART B – DESIGN AND CONSTRUCTION
CS-P 150 Propeller Safety Analysis
Para. (c)

Cmt. ***Hamilton Sundstrand Corporation***

In second sentence change 'is likely to' to 'could'	Accepted.

Justification

Classification of a propeller part as critical should be made based on the consequence of failure to function as designed when used as intended not on the likelihood that a hazardous condition could occur when the product fails. The phrase “is likely to,” allows a decision that the hazardous consequence is an unlikely result of the failure and the part might not be identified as a Propeller Critical Part even though its failure could create a hazardous condition. It could also lead to disagreement as to what fraction of failure consequences constitutes unlikely.

Paragraph *B.1 CS-P* **Add. info:** SUPPART B – DESIGN AND CONSTRUCTION
CS-P 160 Propeller Critical Parts Integrity
Para. (a)

Cmt. ***Hamilton Sundstrand Corporation***

First sentence to be changed as follows: An Engineering Plan, the execution of which establishes and maintains that the combinations of loads, material properties, environmental influences and operating conditions, including the effects of parts influencing these parameters, are sufficiently well known or predictable, by validated analysis, test or service experience, to allow Propeller Critical Parts to have periodic verification of airworthiness or be withdrawn from service at an approved life limit.	Partially Accepted. While the intent of the comment is understood and accepted, different text is adopted as a result of consideration of this and other comments received. The revised text of CS-P 160(a) is believed to offer a more objective statement and now reads as follows: (a) An Engineering Plan, the execution of which establishes and maintains that the combinations of loads, material properties, environmental influences and operating conditions, including the effects of parts influencing these parameters, are sufficiently well known or predictable, by validated analysis, test or service experience, to ensure Propeller Critical Parts have a high level of integrity throughout their service life. Any Approved Life must be published as required in CS-P 40(b).

Justification

The adjustment is necessary to address some Propeller Critical Parts that have established unlimited life through development test and analysis and are only retired from service if periodic mandatory inspections reveal conditions that would prevent continued safe operation until the next mandatory inspection. They do not have a quantified approved life

Comment	Response
Whole NPA	
Paragraph - **Add. info:**	
Cmt. *ACG Austria*	
NPA 05-2005 is fully supported by Austro Control.	Noted.
Justification	
Cmt. *CAA-UK*	
Critical Part and associated terms are not included. Reference to critical parts is made in CS-P150(c) and CS-P160, but lacks clarity due to the lack of definition within CS-P15. Also, CS-E15 Terminology has within it definitions for; Engine Critical Part, and (f) includes terms associated with critical parts. In order to minimise confusion and have some consistency it is recommended that CS-P is modified in line with CS-E.	Accepted. All propeller specific definitions will be moved to CS-P 15. Any definition having a broarder scope and applicable to other CSs will be included in CS-Definitions. This accords with EASA policy on definitions.
Justification	
Clarification and to provide consistency with other documents.	
Cmt. *GAMA*	
*** SEE PAPER COPY ***	Noted.
Justification	