

CHANGED PRODUCT RULE (CPR)
Aviation Rulemaking Committee (ARC)
Addendum to Final Report
Submitted on December 20, 2024

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CPR ARC Phase 2 Addendum

I. Executive Summary

The Federal Aviation Administration (FAA) chartered the Changed Product Rule (CPR) Aviation Rulemaking Committee (ARC) on April 15, 2024.¹ The ARC was chartered to consider the requirements from Section 117 of the Aircraft Certification, Safety, and Accountability Act,² the recommendations from the CPR International Authorities Working Group (IAWG),³ and materials and public comments within Docket FAA-2023-0305 to evaluate the need for new rulemaking and development of FAA policy and guidance to ensure an adequate certification basis is established for changed products, including amendments to section 21.19 of title 14 of the Code of Federal Regulations (CFR) for changes requiring a new type certificate (TC) and the basis for such determination.⁴

The ARC submitted its final recommendation report to the FAA on December 20, 2024.⁵ In that report, the ARC requested additional time to further analyze some of the charter taskings. In response, the FAA requested more information from the ARC.

References to “Phase 1” in this addendum include ARC deliberations from the ARC’s kick off plenary on June 20, 2024, to the submission of the final recommendation report on December 20, 2024. References to “Phase 2” in this addendum include ARC deliberations from when the ARC reconvened on February 27, 2025, until the submission of this report on July 8, 2026. The ARC received the FAA’s official request for more information on July 21, 2025.

In their request, the FAA requested clarity on the following topics:

- Definitions of Key Terms (recommendations in Section II.A of this report)
- Affected Areas (recommendations in Section II.B of this report)
- Exceptions (recommendations in Section II.C of this report)
- Certification Basis Documentation (recommendations in Section II.D of this report)

In addition to the topics listed above, this addendum includes a recommendation (Section II. E REC A27) to update the examples provided in AC 21.101-1B, Appendix A, Classification of Design Changes. In its December 2024 report,⁶ the ARC requested more time to develop this material. The recommendation for updating the examples is discussed in Section II.E and Appendix I of this addendum.

The ARC established the following five working groups to complete this report addressing the FAA’s requests for more information.

¹ Changed Product Rule Aviation Rulemaking Committee Charter (April 15, 2024).

² Pub. L. 116-260, 134 Stat. 2309

³ International Authorities Working Group (IAWG) Public Meeting Slides (February 28, 2023).

⁴ Docket No., FAA-2023-0305-0001, Input to Changed Product Rule International Authorities Working Group Recommendations.

⁵ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024).

⁶ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 64].

- Working Group 1 - Definitions and Reference Type Design (RTD)
- Working Group 2 - Definitions and Affected Areas
- Working Group 3 - AC 21.101-1B Appendix A Examples
- Working Group 4 - Impractical Exceptions and Additional Design Requirements and Conditions (IE/ADRC)
- Working Group 5 - Certification Basis Documentation

The ARC's original December 2024 report contained 14 recommendations, labeled "REC1" through "REC14." Many references to the original report are contained in this document using that numbering system. The recommendations in this addendum are labeled "REC A1" through "REC A28" with "A" representing "addendum."

Below is a list of the recommendations in this report. A detailed description of the intent, rationale, and approach for each recommendation is provided in Section II.

1. REC A1 – Product level change
The FAA should revise Advisory Circular (AC) 21.101-1B (Appendix J) to add the definition of "product level change."
2. REC A2 – Not significant change
The FAA should revise AC 21.101-1B (Appendix J) to update the definition of "significant change."⁷
3. REC A3 – Substantial change
The FAA should revise AC 21.101-1B (Appendix J) to include the definition of "substantial change" and amend § 21.19(a) to clarify that the comparison is between the resulting product and the reference type design.
4. REC A4 – Substantially complete demonstration of compliance
The FAA should revise AC 21.101-1B Section 3.3.2 and Appendix J to include "substantially complete demonstration of compliance."
5. REC A5 – General configuration
The FAA should revise AC 21.101-1B Section 3.6.1.1 and Appendix J to separate the term "general configuration" from a change to the general configuration that would be considered significant.
6. REC A6 – Principles of construction
The FAA should revise the definition for "principles of construction" in AC 21.101-1B, Section 3.6.1.2 and add the same definition in Appendix J.
7. REC A7– Assumptions used for certification
The FAA should revise AC 21.101-1B Appendix J to provide a clear definition of "assumptions used for certification" that relates directly to the product key characteristics.

⁷ The FAA requested that the ARC define "not significant change," but the ARC determined it is not necessary to define this term because the definition of "significant change" in Appendix J of AC 21.101-1B already addresses *the significance of the change*.

8. REC A8 – Affected area
The FAA should revise the definition of “affected area.”
9. REC A9 – Physical characteristics
The FAA should revise the definition of “physical changes.”⁸
10. REC A10 – Functional characteristics
The FAA should revise the definition of “functional changes.”⁹
11. REC A11 - Key design and operational characteristics
The FAA should revise the definition of “product key characteristics.”¹⁰
12. REC A12 – Transverse/Other requirements
The FAA requested that the ARC define “transverse/other requirements.” However, the ARC recommends that this term does not need a definition and that any use of the of this term in the original ARC report be replaced with “broad scope of applicability requirement.”
13. REC A13 – Does not contribute materially to the level of safety
The FAA should define “does not contribute materially to the level of safety.”
14. REC A14 – Impractical
The FAA should revise the definition of “impractical.”
15. REC A15 – Reference type design
The FAA should update the definition of the “reference type design” used for substantial determination under 14 CFR 21.19.
16. REC A16 – Additional design requirements and conditions (ADRCs)
The FAA should update § 21.101(b) and AC 21.101-1B to formally define “additional design requirements and conditions” (ADRCs) and provide guidance on its usage.
17. REC A17 – Revision of 14 CFR 21.19 terminology: investigation vs demonstration
The FAA should clarify the regulatory trigger for substantial changes by revising the terminology within 14 CFR 21.19, replacing the phrase “investigation of compliance” with “demonstration of compliance.”
18. REC A18 – Iterative methodology for scoping affected areas and verifying completeness
The FAA should develop and publish within AC 21.101-1B a standardized, continuous, and iterative methodology for identifying, scoping, and verifying the completeness of affected areas.

⁸ The FAA requested clarification for the term “physical characteristics,” but the ARC determined “physical changes” is the better term.

⁹ The FAA requested clarification for the term “functional characteristics,” but the ARC determined “functional changes” is the better term.

¹⁰ The ARC recommends the FAA include groups “key design and operational characteristics” under the definition for “product key characteristics.”

19. REC A19 – Addressing broad scope of applicability requirements and technical consistency
The FAA should update AC 21.101-1B to introduce formal guidance requiring applicants to iteratively adjust and expand the scope of the initially defined affected area to account for the “broad scope of applicability” inherent to certain airworthiness requirements.
20. REC A20 – Revise § 21.101(b)
The FAA should revise 14 CFR 21.101(b) to remove the influence of later amendments in the determination of significance.
21. REC A21 – Public notice and comment on impractical exceptions (IE) and additional design requirements and conditions (ADRCs)
The FAA should provide a process framework in the Preamble to the final rule notice amending § 21.101 to address the need for public notice and comment on impractical exceptions and additional design requirements and conditions granted under § 21.101(b)(3).
22. REC A22 – Identifying product key characteristics
The FAA should provide guidance to identify the product key characteristics involved in the changed product substantial assessment.
23. REC A23 – Standard format for type certificate data sheet (TCDS) and supplemental type certificates (STC)
The FAA should develop a standard format for the certification basis in both type certificate data sheets (TCDS) and supplemental type certificate (STC).
24. REC A24 – Update AC 21.101-1B Chapter 5.
The FAA should update AC 21.101-1B Chapter 5.¹¹
25. REC A25 – Update part 23, Amendment 23-64
The FAA should update the Part 23 Amendment 23-64 Implementation Procedures Guide.¹²
26. REC A26 – Consider performance-based regulations (PBR) in AC 21.101-1B
The FAA should revise AC 21.101-1B to consider the performance-based regulation (PBR) principles from part 23, amendment 23-64, which enable the applicant to propose airworthiness means of compliance/detailed design standards (DDS) to address the regulation safety objectives.
27. REC A27 – Update AC 21.101-1B Appendix A examples
The FAA should revise tables Appendix A of AC 21.101-1B¹³ for rotorcraft and airplanes.

¹¹ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. 5-1].

¹² FAA, *Part 23 Amendment 23-64 Implementation Procedures Guide* (June 15, 2022).

¹³ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. A-1].

II. ARC Recommendations

A. Definitions of Key Terms

1. FAA Request

Define key terms used by the changed product process under §§ 21.19 and 21.101 of title 14, Code of Federal Regulations. If the ARC proposes the introduction of new key terms, these should also be included. Any key terms that could benefit from being codified within the context of § 21.1 should also be highlighted. At a minimum, the following terms should be defined unless the ARC proposes the term to be removed from rulemaking or associated guidance:

- i. product-level change,*
- ii. not significant change,*
- iii. substantial change,*
- iv. substantially complete investigation of compliance,*
- v. general configuration,*
- vi. principles of construction,*
- vii. assumptions used for certification,*
- viii. affected area,*
- ix. physical characteristics,*
- x. functional characteristics,*
- xi. key design and operational characteristics,*
- xii. transverse/other requirements,*
- xiii. does not contribute materially to the level of safety,*
- xiv. impractical.*

2. ARC Recommendations - Definitions

REC A1 - Product Level Change

RECOMMENDATION:

The FAA should revise AC 21.101-1B (Appendix J)¹⁴ to add the definition of “product level change” as described in the approach section below.

INTENT (Applies to all recommendations in Section II.A of this addendum):

To review, and if required, define each term based on the FAA’s request for more information.

RATIONALE:

The original ARC final report (REC 7)¹⁵ provided the following definition of “product level change”:

Any change is a change to the product, and its effects are assessed at the product level. Some changes affect the key operational and design characteristics and depending on the magnitude of the change, a major change could be classified as major, not significant, significant or substantial. Only a change affecting the key operational and design characteristics which makes the product distinct from its baseline configuration (or reference type design as applicable) is considered a “product level change” and therefore, would be classified as either significant or substantial.

In August 2025, the International Authorities Working Group (IAWG) provided feedback explaining that the definition of product level change above is complex and imprecise, and a revised definition is likely to add more subjectivity and result in a different (e.g., lower) number of significant change determinations.

The IAWG noted that “key operational and design characteristics” also need to be further defined. The IAWG expressed concerns that the proposed definition requires both “key operational” AND “design characteristics” to be triggered for a “product level change.” The IAWG believe this should be changed to OR, noting that the proposal seems to complexify the material and consequently the CPR process and that the ARC tasking is to simplify the guidance, while keeping the same principles.

The ARC reviewed the definition and agreed with the IAWG feedback that a simpler definition could be developed. The ARC recognized that, fundamentally, significant or substantial product level changes are those that make a product distinct from its predecessor, but product level changes can be classified as not significant. The ARC concluded that substantial and significant changes are changes that make the resulting product distinct from its predecessor. However, this does not need to be addressed in the definition of product level change, as it is addressed in the substantial and significant change criteria.

In reviewing the IAWG’s feedback, the ARC agreed that it did not intend to require both “key operational” and “design characteristics” to be triggered for a “product level change.” The feedback

¹⁴ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. J-2].

¹⁵ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 33].

was resolved with a change from the term “key design and operational characteristics” to “product key characteristics,” (see REC A11 of this report).

APPROACH:

The ARC recommends that the FAA revise AC 21.101-1B (Appendix J) with the following concise definition:

Appendix J:

Product level change:

A change affecting the product key characteristics. Product level changes can be substantial, significant, or not significant.

REC A2 - Not Significant Change

RECOMMENDATION:

The FAA should revise AC 21.101-1B (Appendix J)¹⁶ to update the definition of “significant change” as described in the approach section below.

RATIONALE:

Although the FAA requested the ARC define “not significant change,” the ARC determined it is not necessary to define this term because the definition of “significant change” in AC 21.101-1B Appendix J already addresses *the significance of the change*. The IAWG, in its feedback to the ARC provided in October 2025, also questioned the need for a stand-alone definition of “not significant change.” However, the ARC recommends the FAA should revise the definition of “significant change.”

“Significant change” is defined in 14 CFR 21.101 and in AC 21.101-1B as follows:

Section 21.101(b)(1):

...Changes that meet one of the following criteria are automatically considered significant:

- (i) The general configuration or the principles of construction are not retained.*
- (ii) The assumptions used for certification of the product to be changed do not remain valid.*

AC 21.101-1B (Appendix J):

Significant Change: A change to the type certificate to the extent that it changes one or more of the following, but not to the extent to be considered a substantial change: general configuration, principles of construction, or the assumptions used for certification. The significance of the change is considered in the context of all previous relevant design changes and all related revisions to the applicable regulations. Not all product level changes are significant.

In addition to the definitions above, the ARC found that AC 21.101-1B (Section 3.6.1) discusses product level changes in the context of significant changes. The current definition does not link significant changes to changes at the product level. For clarity, the ARC concluded that the definition should be revised to explicitly state that significant changes are product level changes to remove this ambiguity.

The ARC determined that the definition for a significant change should refer to a change to the baseline product listed on the type certificate data sheet (TCDS), rather than to the type certificate (TC), as that more accurately reflects the change that is being assessed.

The current definition also references revisions to the applicable regulations. The ARC, in REC A18, recommends that revisions to applicable regulations should not influence the significance determination and therefore should be removed from the definition of significant. The ARC found the phrase *considered in the context of* to be confusing and clarified that the intent was to account for

¹⁶ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. J-2].

all previous relevant design changes to the baseline product when making the significance determination. The ARC found the last sentence in the definition to be redundant, as this is already stated in REC A1 under the recommended definition for product level change.

APPROACH:

The ARC recommends that the FAA revise AC 21.101-1B Appendix J with the following definition that ties significant changes to product level changes and removes the influence of revisions to applicable regulations.

Appendix J:

Significant Change:

A product level change to the baseline product that changes one or more of the following, but not to the extent to be considered a substantial change: general configuration, principles of construction, or the assumptions used for certification. Assessing the significance of the change includes accounting for all previous relevant design changes to the baseline product.

REC A3 - Substantial Change

RECOMMENDATION:

The FAA should revise AC 21.101-1B (Appendix J)¹⁷ to include the definition of “substantial change” and amend § 21.19(a) to clarify that the comparison is between the resulting product and the reference type design as described in the approach section below.

RATIONALE:

The ARC reviewed the following instances where the term “substantial change” is used within 14 CFR part 21, AC 21.101-1B, and in REC3 of the December 2024 ARC report.¹⁸

Section 21.19:

Each person who proposes to change a product must apply for a new type certificate if the FAA finds that the proposed change in design, power, thrust, or weight is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.

AC 21.101-1B, Appendix J:

A change that is so extensive that a substantially complete investigation of compliance with the applicable regulations is required, and consequently a new type certificate is required pursuant to § 21.19.

December 2024 ARC Report (REC3): § 21.19(a):

Except as provided in paragraph (b) of this section, each person who proposes a major change to a product must apply for a new type certificate if the FAA finds that the difference in the resulting product compared to the applicable reference type design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.

In its original report, the ARC identified the following three objectives to be addressed in the proposed change to § 21.19:

- To introduce the term “reference type design.”
- Provide exceptions for situations where a new TC is not required, even if the change could be considered “extensive.”
- Provide clarification that the application of § 21.19 is expected to occur only after a proposed change has been classified as major.

The ARC did not change the objectives above as part of this task, but it reviewed the definition to determine if it required clarification. The ARC confirmed from reviewing REC3 of the 2024 ARC Final Report recommendation that any definition for “substantial” needs to be linked to the “multi-criteria approach,” meaning that a change to one criterion (design, power, thrust, or weight) would not in

¹⁷ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. J-3].

¹⁸ Changed Product Rule Aviation Rulemaking Committee, *Final Report*, (December 20, 2024) [p. 25].

itself make a change substantial. The ARC notes that the recommended change to § 21.19(a) and the existing definition in AC 21.101-1B are consistent and do not include reference to design, power, thrust, or weight.

Based on review of the definitions, the ARC identified modest improvements. For § 21.19(a), the ARC recognized that the definition in REC3 of the ARC Final Report¹⁹ could be modified to clarify the comparison to determine significance is between the resulting product and the reference type design and not the resulting product alone.

The ARC determined that the definition in AC 21.101-1B Appendix J should align more closely with § 21.19 to clarify that substantial changes are major changes (that also need to pass the significant threshold) and that the basis for the substantial assessment is a comparison between the resulting product and the reference type design.

Note: In REC A17 of this addendum, the ARC recommends changing the word “investigation” to “demonstration” in § 21.19 and AC 21.101-1B to avoid confusion with the “investigation” of the affected area for a change.

APPROACH:

The ARC recommends that the FAA revise AC 21.101-1B (Appendix J) with the following definition of “substantial change” to clarify that substantial changes are significant changes and are based on a comparison of the resulting product to the reference type design and to change “investigation of compliance” to “demonstration of compliance.”

Appendix J:

Substantial Change:

A significant change where the difference between the resulting product compared to the applicable reference type design is so extensive that a substantially complete demonstration of compliance with the applicable regulations is required.

Additionally, the FAA should amend § 21.19(a) to clarify that the comparison is between the resulting product and the reference type design and to change “investigation of compliance” to “demonstration of compliance.”

Section 21.19

Changes requiring a new type certificate

(a) Except as provided in paragraph (b) of this section, each person who proposes a significant change to a product in accordance with § 21.101 must apply for a new type certificate if the FAA finds that the difference between the resulting product when compared to the applicable reference type design is so extensive that a substantially complete demonstration of compliance with the applicable regulations is required.

(b)... (unchanged from ARC Final Report REC3 recommendation)

¹⁹ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 25].

REC A4 - Substantially Complete Demonstration of Compliance

RECOMMENDATION:

The FAA should revise AC 21.101-1B Section 3.3.2²⁰ and Appendix J to include “substantially complete demonstration of compliance” as described in the approach below.

RATIONALE:

The IAWG feedback provided in October 2025 recognized that a “substantially complete investigation of compliance” was almost a complete re-evaluation of the changed product’s compliance findings to the applicable regulations and that while some compliance findings could be reused if they need to be re-evaluated, it does not matter if they are reused.

The ARC reviewed the following instances where the term “substantially complete investigation of compliance” is used in 14 CFR part 21, AC 21.101-1B, and the original ARC final report.

Section 21.19:

The phrase is used but is not defined.

AC 21.101-1B (Section 3.3.2):

A “substantially complete investigation” of compliance is required when most of the existing substantiation is not applicable to the changed product. In other words, you may consider the design change substantial if it is so extensive (making the product sufficiently different from its predecessor) that the design models, methodologies, and approaches used to demonstrate a previous compliance finding could not be used in a similarity argument. The FAA considers a change substantial when these approaches, models, or methodologies of how compliance was shown are not valid for the changed product.

The ARC included several examples of what would and would not be considered a substantially complete investigation of compliance in its December 2024 Final Report, but the ARC did not propose a concise definition.

Note: In REC A17 of this addendum, the ARC recommends changing the word “investigation” to “demonstration” in § 21.19 and AC 21.101-1B to avoid confusion with the “investigation” of the affected area for a change.

The ARC determined that it is important to provide a clear definition of “substantially complete demonstration of compliance” as the trigger for determination of a substantial change but recognized the difficulty in qualifying the amount of compliance demonstration required to pass the substantial threshold. A substantial change is when the product is sufficiently different from its “reference type design” that nearly all the existing compliance data cannot be reused, and new compliance data is generated. Although difficult to quantify, the ARC agrees that any definition needs to address the magnitude of redemonstration required and not limit the use of the “multi-criteria approach” recommended in REC3 of the original Final ARC Report.²¹ The ARC also agreed that it

²⁰ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. 3-4].

²¹ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 25].

would be helpful if the definition were backed up with concrete examples, as provided in Appendix A of AC 21.101-1B.

APPROACH:

The ARC recommends that the FAA revise AC 21.101-1B Section 3.3.2 and Appendix J²² as follows:

Section 3.3.2

A substantially complete demonstration of compliance for a changed product is the process by which nearly all the product's existing compliance data needs to be reestablished. This is necessary when the product is sufficiently different from its reference type design that none or only a minimal amount of existing compliance data can be reused for the resultant changed product.

Appendix J:

Substantially complete demonstration of compliance:

The process by which nearly all the product's existing compliance data needs to be reestablished. This is necessary when the product is sufficiently different from its reference type design that none or only a minimal amount of existing compliance data can be reused for the resultant changed product.

Examples of changes that would require a substantially complete demonstration of compliance include:

- Airplane change to the number or location of engines, (e.g., four to two wing-mounted engines or two wing-mounted to two body-mounted engines).
- Change from the number and/or configuration of rotors (e.g., main and tail rotor system to two main rotors) on a rotorcraft
- Change to the number of main rotor blades combined with a Maximum Take-Off Weight (MTOW) increase of 40% and change from federated instruments to an integrated avionics system on a rotorcraft.

²² FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. 3-4].

REC A5 - General Configuration

RECOMMENDATION:

The FAA should revise AC 21.101-1B Section 3.6.1.1²³ and Appendix J²⁴ to separate the term “general configuration” from a change to the general configuration that would be considered significant, as described in the approach section below.

RATIONALE:

In August 2025, the IAWG provided feedback to the ARC noting that, in principle, they agree with the proposed definitions for “general configuration and principles of construction.” The feedback was reinforced in October 2025 and the IAWG stated that a significant change to the general configuration is one that makes the resulting product clearly distinct from the baseline product by a change of key design characteristics. The IAWG suggested the ARC provide more examples to illustrate acceptable thresholds.

The term “general configuration” is used in 14 CFR 21.101 (b) in referring to changes that would be considered significant changes, but the term is not defined. The ARC reviewed the following instances where the term “general configuration” is used within AC 21.101-1B and the ARC Final Report.²⁵

AC 21.101-1B (3.6.1.1):

A change to the general configuration at the product level is one that distinguishes the resulting product from other product models, for example, performance or interchangeability of major components. Typically, for these changes, an applicant will designate a new product model, although this is not required. For examples, see appendix A of this AC.

ARC Final Report (REC 5):

General configuration refers to the basic product layout and arrangement of major items to support the intended product use. A significant type design change to the general configuration is one that distinguishes the resulting product from the baseline product, such as changes to: the overall shape or layout; external items having aerodynamic effects (e.g., wings, empennage, engines, rotors); number or location of exits or cargo doors; type of landing gear; and changes to the crew interface (e.g., analogue to digital flight deck).

In both cases, the description of “general configuration” includes the need for a significant change to the general configuration to be one that distinguishes the resulting product from other product models. However, the definitions provided above do not directly address general configuration alone.

Therefore, the ARC agrees that a new definition should separate the general configuration from a change to the general configuration that would be significant. In addition, for consistency, the

²³ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. 3-7].

²⁴ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. J-1].

²⁵ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 30].

definition should refer to the physical product key characteristics rather than the key design characteristics.

APPROACH:

The ARC recommends that the FAA revise AC 21.101-1B Section 3.6.1.1 and Appendix J to separate the term “general configuration” from a change to the general configuration that would be considered significant. Consistent with the IAWG request, the ARC recommends including examples of changes to the general configuration that would pass the significant threshold. The following presents the ARC’s recommended revisions:

Section 3.6.1.1:

Changes where the General Configuration is Not Retained (Significant Change to General Configuration).

General configuration refers to the basic product layout and arrangement of physical product key characteristics to support the intended product use. A significant type design change to the general configuration is one that clearly distinguishes the resulting product from the baseline product.

Appendix J:

General configuration. Refers to the basic product layout and arrangement of physical product key characteristics to support the intended product use. A significant type design change to the general configuration is one that clearly distinguishes the resulting product from the baseline product. Examples of changes that could invalidate the general configuration at the product level include:

- Airplane conversion between cargo and passenger configurations.
- Change to the number of main rotor blades on a rotorcraft.
- Replacement of reciprocating with turbo-propeller engines on an airplane.

Additional examples are provided in Appendix A.

REC A6 - Principles of Construction

RECOMMENDATION:

The FAA should revise the definition for “principles of construction” in AC 21.101-1B, Section 3.6.1.2,²⁶ and add the same definition in Appendix J, as described in the approach section below.

RATIONALE:

In August 2025, the IAWG noted that in principle, they agree with the proposed definitions for “general configuration” and “principles of construction” in the original ARC report.²⁷ The IAWG suggested the ARC provide more examples to illustrate acceptable thresholds.

The term “principles of construction” is used in 14 CFR 21.101(b) to refer to changes that would be considered significant changes, but the term is not defined. The ARC reviewed the following instances where the term “principles of construction” is used within AC 21.101-1B and the original ARC Final Report.²⁸

AC 21.101-1B (3.6.1.2):

A change at the product level to the materials and/or construction methods that affects the overall product’s operating characteristics or inherent strength and would require extensive reinvestigation to show compliance. For examples, see appendix A of this AC.

ARC Report (REC5):

A significant type design change to the principles of construction is one that introduces a distinct change to the materials and manufacturing processes that make up the structural configuration of the baseline product and may thus affect its operating characteristics or structural performance at the product-level. This concept includes the types of materials (e.g., metallic, composite, ceramic) as well as special manufacturing processes (e.g., additive manufacturing).

After reviewing the information above, the ARC determined that the definition provided under REC5 in the original ARC Report is clear and unambiguous.²⁹ However, the ARC recognizes that this definition is not consistent with the definition for “general configuration” and does not separate the definition of “principles of construction” from “significant changes.”

²⁶ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. 3-7].

²⁷ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 30].

²⁸ *Ibid.*

²⁹ *Ibid.*

APPROACH:

The ARC recommends that the FAA revise the definition for “principles of construction” in AC 21.101-1B, Section 3.6.1.2 and add the same definition in Appendix J as follows:

Section 3.6.1.2:

Changes where the Principles of Construction are Not Retained (Significant Change to Principles of Construction).

Principles of construction refers to the types of materials (e.g., metallic, composite, ceramic) as well as manufacturing processes (e.g., additive manufacturing) included in the design of the product. A significant type design change to the principles of construction is one that introduces a distinct change to the materials and/or manufacturing processes that affect the structural product key characteristics of the changed product from those of the baseline product.

Appendix J:

Principles of construction:

Refers to the types of materials (e.g., metallic, composite, ceramic) as well as manufacturing processes (e.g., additive manufacturing) included in the design of the product. A significant type design change to the principles of construction is one that introduces a distinct change to the materials and/or manufacturing processes that affect the structural product key characteristics of the baseline product.

Examples of changes that could invalidate the principles of construction at the product level include:

- Change of primary structure from metallic to composite.
- Change of primary structure to additive manufactured.

Note: Changes in materials/processes to individual parts are not considered to be product level changes. Examples of product level changes in principles of construction are changing the entire fuselage or an entire wing from metallic to composite or additively manufactured material.

Additional examples are provided in Appendix A of the AC.

REC A7 - Assumptions Used for Certification

RECOMMENDATION:

The FAA should revise AC 21.101-1B Appendix J³⁰ to provide a clear definition of “assumptions used for certification” that relates directly to the product key characteristics as described in the approach section below.

RATIONALE:

In August 2025, the IAWG expressed that they disagree with the definition for “assumptions for certification,” specifically allowing the reuse and extrapolation of existing data to be excluded from the significant determination. The IAWG expressed concerns with the definition of “assumptions for certification,” stating it was seen as ambiguous and potentially too restrictive.

The ARC reviewed the following instances where the term “assumptions used for certification” is used within 14 CFR part 21, AC 21.101-1B, and in REC5 of the ARC Final Report.³¹

AC 21.101-1B (Appendix J):

The assumptions used for certification are the evaluations and decisions that led to the approval of the baseline product’s characteristics. Examples of the product’s baseline characteristics include, but are not limited to—

- *Design methodologies, methods of compliance, and standards used to achieve compliance with the regulations making up the certification basis;*
- *Structural, mechanical, electrical, propulsion, aerodynamic, performance, operational, and maintenance characteristics;*
- *Operational and flight envelopes defining the product performance and capabilities at specified weights, speeds, altitudes, load factors, and centers of gravity;*
- *Crashworthiness;*
- *Role or mission;*
- *Airworthiness and operational limitations; or*
- *Pilot training, if necessary.*

AC 21.101-1B (3.6.1.3):

Product Level Changes that Invalidate the Assumptions used for Certification of the Baseline Product.

Examples include—

- *Change of an aircraft from an unpressurized to pressurized fuselage,*

³⁰ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. J-1].

³¹ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 30].

- *Change of operation of a fixed wing aircraft from land-based to water-based, and*
- *Operating envelope expansions that are outside the approved design parameters and capabilities.*

Additional examples are provided in Appendix A.

ARC Report (REC5):

The Assumptions Used for Certification of a baseline type design refer to the key design and operational characteristics (see new Product Level Change definition proposed for Appendix J) for which the certification basis was found to be adequate, as well as the associated compliance approach that would apply.

The Assumptions Used for Certification are invalidated in one or both of the following scenarios:

- 1. The change to type design requires consideration of new or different types of hazards at the product-level from those certified on the baseline product, thus requiring an updated certification basis.*
- 2. The product's key design and operational characteristics have changed to such an extent that the compliance approach used for the baseline product cannot be reused or extrapolated for the changed product.*

The ARC reviewed the definitions above and considered IAWG feedback. The ARC determined the current definition in AC 21.101-1B has proven difficult to apply consistently when determining whether a design change is significant or not significant, especially outside of the examples in AC 21.101-1B, Appendix A. The ARC believes the IAWG misunderstood the phrase *compliance approach cannot be extrapolated*, confusing it with extrapolation of compliance data. Additionally, the ARC believes there is a perception that the definition is being used as a “wild card” to classify changes as significant.

The original REC5 definition contains two distinct aspects:

1. Identifying new or different product level hazards, and
2. Evaluating whether the baseline product's compliance approach can still be used.

The second aspect is problematic because the term “compliance approach” is not clearly defined in the original ARC report even though it is referenced multiple times. The term was introduced to replace “means and methods of compliance” and was intended to refer only to the analytical methods, test methods, and techniques used to demonstrate compliance with the applicable requirements—without implying changes to the means and methods of compliance described in guidance material.

Based on IAWG feedback and to improve clarity, the term “extrapolated” could be removed. The ARC concluded that the definition was generally sound but required two refinements:

1. Formally define “compliance approach” as the methods and techniques adequate to demonstrate compliance, and

2. Remove the word “extrapolated” from the phrase describing reuse of the compliance approach.

As such, the ARC proposed the following definition for consideration:

The “assumptions used for certification” of a baseline type design refer to the key design and operational characteristics (see new “product level change” definition proposed for Appendix J) for which the certification basis was found to be adequate, as well as the associated compliance approach that would apply.

The “assumptions used for certification” are invalidated in one or both of the following scenarios:

- 1. The product’s key design and operational characteristics have changed to such an extent that the compliance approach used for the baseline product cannot be reused for the changed product.*
- 2. When there is a need to address new or different types of hazards which are directly a result of a product level change introducing a new hazard at the product level from those certified on the baseline product, thus requiring an updated certification basis.*

Additional feedback from the IAWG in October 2025 included to consider how amendments to applicable airworthiness standards affect the significant determination. The insertion of “*When there is a need to address new or different types of hazards*” in the proposed definition above was meant to address new hazards that could be identified through new or amended standards. The influence of amendments to applicable airworthiness standards in the significant/not significant decision is discussed separately in REC A18. The conclusion of REC A18 is to remove the influence of later amendments from the definition and have the definition focus only on the change to the product alone.

Based on this conclusion, the ARC focused its efforts on removing ambiguity so that the term “assumptions used for certification” could be clearly understood and applied consistently. The intent was to ensure that the definition genuinely defined the term and aligned with its use within the CPR framework. During discussions, the ARC considered whether “assumptions” was the most appropriate term once it agreed that the “assumptions” refers to the defined key product characteristics. The ARC found that the term “hazards”³² could have many different meanings and notes that the hazards being addressed are the hazards related to the changes to the product key characteristics.

APPROACH:

The ARC recommends that the FAA revise AC 21.101-1B Appendix J as follows to provide a clear definition of “assumptions used for certification” that relates directly to the product key characteristics:

³² See [14 CFR 5.3](#). “Hazard means a condition or an object that could foreseeably cause or contribute to an incident or aircraft accident, as defined in 49 CFR 830.2.”

Appendix J:

Assumptions used for certification:

The defined operating conditions, configurations, system architectures, behaviors, environments, and intended uses derived from the product key characteristics under which compliance with the applicable certification basis is demonstrated.

The assumptions used for certification are invalidated when the changes to the product key characteristics introduce or modify hazards to the extent that the original compliance approach cannot be reused (e.g., the changed product requires a demonstration of compliance outside of the accepted means of compliance on the baseline product, so as to require new test methods or techniques).

Examples of changes that could invalidate the assumptions used for certification at the product level include:

- Change from fixed (mechanical) controls to a fly by wire control system,
- Introduction of a new operating environment (e.g., icing, Instrument Meteorological Conditions/Instrument Flight Rules),
- Change from manned to autonomous or unmanned operation,
- Modification from an unpressurized to pressurized fuselage,
- Reduction in the minimum flight crew requirement.

Additional examples are provided in Appendix A.

REC A8 - Affected Area

RECOMMENDATION:

The FAA should revise the definition of “affected area” as described in the approach section below.

RATIONALE:

In August 2025, the IAWG gave feedback that they supported the creation of a structured framework for defining “affected areas.” IAWG expressed that definitions should be practical and avoid excessive abstraction or ambiguity, and terms such as “physical areas,” “functional areas,” and “operational areas” should be revised for clarity and usability. The IAWG asked that the “affected area” categorization should be helpful but not rigid, allowing engineering judgment where appropriate.

APPROACH:

The ARC recommends that the FAA revise the definition in AC21.101-1B Section 3.9 and in Appendix J. Additional discussion of the affected area concept is provided in Section II.B of this report.

The “affected area” of a changed product refers to the areas of the product (components, systems, zones, etc.) and characteristics of the product (performance, handling qualities, pilot workload, human factors, etc.) for which new *demonstrations of compliance* are required, as a result of:

1. The baseline product’s existing compliance being invalidated by the change.
2. The introduction of new or revised airworthiness requirements via the certification basis of the changed product being upgraded to a later amendment level. New or revised airworthiness requirements may alter the area of intended applicability to the design. Similarly, newly added airworthiness requirements may be applicable to areas of the product not previously subject to a demonstration of compliance. In both cases, the application of later amendments may change the affected area directly.

NOTE: A new or revised airworthiness requirement should not be cause for expanding the *affected area* if the requirement’s applicability to the product design is clearly beyond the direct and indirect effects of the changes of the product’s design characteristics (*affected area* of the change). A new or revised airworthiness requirement introduced by the latest amendment which would have clear applicability solely to an area of the design not affected by the change (beyond or outside the *affected area*), would, by definition, not apply but rather would remain at the amendment level of the baseline product.

REC A9 - Physical Changes

RECOMMENDATION:

The FAA should revise the definition of “physical changes”³³ as described in the approach section below.

RATIONALE:

In August 2025, the IAWG gave feedback that it supported the creation of a structured framework for defining “affected areas.” IAWG expressed that definitions should be practical and avoid excessive abstraction or ambiguity, and terms such as “physical,” “functional,” and “operational” areas should be revised for clarity and usability. The IAWG asked that the “affected area” categorization should be helpful but not rigid, allowing engineering judgment where appropriate.

APPROACH:

The ARC recommends the FAA revise the following definition in Section 3.9.4.1 and in Appendix J of AC 21.101-1B³⁴:

Physical Change. A change that alters the product's physical characteristics, such as structure, components, installation, materials, geometry, etc. Physical Changes encompass changes to the top-level product definition through the intermediate level assemblies down to the bottom elementary parts. Physical changes include the intended changes and any supporting modifications to accommodate the intended change.

³³ The FAA requested clarification for the term “physical characteristics,” but the ARC determined “physical changes” is the better term.

³⁴ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. 3-11].

REC A10 - Functional Changes

RECOMMENDATION:

The FAA should revise the definition of “functional changes”³⁵ as described in the approach section below.

RATIONALE:

In August 2025, the IAWG stated that they supported the creation of a structured framework for defining “affected areas” and expressed that definitions should be practical and avoid excessive abstraction or ambiguity. They noted that terms such as “physical,” “functional,” and “operational” areas should be revised for clarity and usability. The IAWG asked for the “affected area” categorization to be helpful but not rigid, allowing engineering judgment where appropriate.

APPROACH:

The ARC recommends that the FAA revise the definition in Section 3.9.4.2 and Appendix J of AC 21.101-1B³⁶:

Functional Changes. Whereas a *physical change* to a product represents a change to a physical feature that defines what the product *is* (how it is physically defined), *functional changes* represent changes to what a product *does* in terms of how it operates (its functionality) to fulfill an intended purpose.

When we speak about *functional changes*, we can speak of the functionality of the product at different levels:

- Top level functions, in terms of changes in the operational environment in which it can operate (e.g., Visual Flight Rules (VFR) to Instrument Flight Rules (IFR), passenger to cargo, no flight in icing conditions to flight in known icing conditions, changes to operating envelope).
- Intermediate system or system of systems level functions (e.g., conventional to fly-by-wire control).
- Single system or bottom level equipment functionality changes through software updates.

Functional changes can be implemented without accompanying physical changes (e.g., new software versions) but often will be done in conjunction with physical changes. A conversion of a conventional flight control to fly-by-wire would clearly involve physical changes but would also implement functional changes as control laws would now alter the relationship between pilot input and control surface movement. The ARC recommends that the term “operational changes” be considered part of the functional changes of the aircraft, and therefore not a separate term.

³⁵ The FAA requested clarification for the term “functional characteristics,” but the ARC determined “functional changes” is the better term.

³⁶ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. 3-11].

REC A11 - Key Design and Operational Characteristics

RECOMMENDATION:

The FAA should revise the definition of “product key characteristics” as described in the approach section below.

RATIONALE:

In August 2025, the IAWG provided feedback stating that “key operational and design characteristics” need to be further defined. The IAWG expressed concerns that the proposed definition requires both “key operational” AND “design characteristics” to be triggered for a “product-level change,” and the IAWG believes this should be OR. IAWG feedback in October 2025 recognized that “key operational and design characteristics” are high-level attributes (physical and functional characteristics) that are related to the primary traits of the product.

The ARC examined the following existing policy guidance within AC 21.101-1B and recommendations from the original ARC report.

AC 21.101-1B (Appendix J) within the “assumptions used for certification” discussion:

The assumptions used for certification are the evaluations and decisions that led to the approval of the baseline product’s characteristics. Examples of the product’s baseline characteristics include, but are not limited to—

- *Design methodologies, methods of compliance, and standards used to achieve compliance to the regulations making up the certification basis;*
- *Structural, mechanical, electrical, propulsion, aerodynamic, performance, operational, and maintenance characteristics;*
- *Operational and flight envelopes defining the product performance and capabilities at specified weights, speeds, altitudes, load factors, and centers of gravity;*
- *Crashworthiness;*
- *Role or mission;*
- *Airworthiness and operational limitations; or*
- *Pilot training, if necessary.*

ARC Report (REC7):

“Key design and operational characteristics” can generally be described as high-level design descriptors, such as passenger capacity, type and number of engines, maximum take-off weight, operating speeds, kinds of operation (e.g., VFR, IFR, day, night, icing), overall human-machine interface architecture, maximum operating altitude, and minimum and maximum operating temperatures. These characteristics taken together define the intended usage of the aeronautical product and the context in which it operates.³⁷

³⁷ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 34].

ARC Report (REC7):

- *Key Design Characteristics:*
 - *Product category/sub-category*
 - *Main physical characteristics*
 - *Fuselage size*
 - *Wing shape, size, and location*
 - *Tail shape, size, and location*
 - *Number and location of engines or rotors*
 - *Architecture (functional/physical) and technology of systems ensuring the:*
 - *Controllability/maneuverability*
 - *Overall human-machine interface architecture*
 - *Structural integrity*
 - *Propulsion type*
 - *Occupant safety/survivability*
 - *Structural material and processes*
- *Key Operational Characteristics:*
 - *Kinds of operation (e.g., VFR, IFR, day, night, icing)*
 - *Operating limitations*
 - *MTOW*
 - *Maximum passenger seating configuration*
 - *Operating envelope (altitude speed/outside air temperature)*
 - *Power/thrust*
 - *Aircraft flight performance and handling qualities*
 - *Flight crew requirements (e.g., minimum crew)*
 - *Maintenance concept*³⁸

ARC Report (REC8):

*...key operational characteristics (kinds of operation, operating limitations, performance, flight crew requirements, etc.), and the affected key design characteristics (physical, architecture, materials, etc.)*³⁹

The ARC agreed that “key design and operational characteristics” were the high-level product descriptors in the December 2024 Final ARC Report. In reviewing their final report, the ARC recognized that the terms “key design and operational characteristics” were always used together and not separated into design characteristics and operational characteristics. The ARC recognized that there has also been debate as to whether some characteristics are “design” or “operational.” As the terms were always used together, the ARC proposes to change the term to “product key characteristics” referring to all the high-level descriptors together.

³⁸ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 33].

³⁹ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 35].

APPROACH:

The ARC recommends that the FAA revise AC 21.101-1B Appendix J⁴⁰ to include the following definition that groups the “key design and operational characteristics” under a singular definition for “product key characteristics”:

Appendix J:

Product key characteristics:

The high-level product descriptors, such as product category/sub-category, main physical configuration, structural materials and processes, system architecture, kinds of operation, operating limitations, flight characteristics, flight crew requirements, and maintenance concept. These characteristics, as applicable, taken together, define the product, its intended usage and the context in which it operates.

Product key characteristics may include, as applicable:

- Product category/sub-category
- Main physical configuration:
 - Fuselage size and shape
 - Layout of doors, exits, and windows
 - Wing shape, size, and location
 - Tail shape, size, and location
 - Type of landing gear
 - Type, number, and location of engines or rotors
- Structural materials and processes
- System architecture
- Kinds of operation (e.g., VFR, IFR, day, night, icing)
- Operating limitations:
 - MTOW
 - Maximum Passenger Seating Configuration
 - Operating envelope (altitude/speed/temperature)
 - Power/thrust
- Flight characteristics (aircraft performance and handling qualities)
- Flight crew requirements (e.g., minimum crew, human-machine interface)
- Maintenance concept

⁴⁰ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. J-1].

REC A12 - Transverse/Other Requirements

RECOMMENDATION:

The FAA requested that the ARC define “transverse/other requirements.” However, the ARC recommends that this term does not need a definition and that any use of this term in the original ARC report be replaced with “broad scope of applicability requirement.”

RATIONALE:

The FAA tasked the ARC with providing a definition for “transverse/other requirements” as part of the FAA’s request for more information.

The terminology was used in the original report, but the ARC never defined it. In Phase 2, the ARC determined that the terminology “transverse/other requirements” was not descriptive enough and did not accurately convey the meaning the ARC intended. Further, the ARC determined that the concept of considering the transverse/other requirements really applies to characteristics that span multiple systems or the entire product; thus, they can be said to have a broad scope of applicability. This has the effect of modifying Figure 3-3⁴¹ of the original ARC report to remove the boxes identified as “other considerations” and “operational considerations.”

APPROACH:

Instead of “transverse/other requirements,” the ARC recommends that the FAA use “broad scope of applicability requirement,” which is taken from the discussion on affected areas in Section II.B of this report.

Some specific airworthiness requirements inherently have a “broad scope of applicability.” A “broad scope of applicability requirement” is a requirement whose application extends beyond a single system or single assembly. It addresses characteristics that span multiple systems or the entire product to achieve the full safety intent of the requirement. Examples: § 2x.1309: Applies to all systems and equipment; § 2x.571: Applies to all Principal Structural Elements.

⁴¹ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 37].

REC A13 - Does Not Contribute Materially to the Level of Safety

RECOMMENDATION:

The FAA should define “does not contribute materially to the level of safety” as described in the approach section below.

RATIONALE:

The ARC was asked to provide a definition for the phrase “does not contribute materially to the level of safety” (DNCMLS).

The following definition takes into account past work, including the Industry white paper: “Changed Product Rule Industry White Paper: ‘Impractical’ and ‘Does Not Contribute Materially to the Level of Safety’ Exceptions In 21.101.”⁴² The ARC also considered the recommendations in the report: “IAWG CPR Team Response to Changed Product Rule Industry Task Force White Paper ‘Changed Product Rule Industry White Paper: ‘Impractical’ and ‘Does Not Contribute Materially to the Level of Safety’ Exceptions In 21.101.’”⁴³ The ARC also considered the recommendations in MITRE report “Study of Type Certification Reform and Section 136 of the Aircraft Certification Safety and Accountability Act” dated March 2022.⁴⁴

The FAA’s finding that a change DNCMLS is based on two parts: (1) the intrinsic safety benefit of the amendment itself, and (2) how far the proposed design is addressing this hazard. This ARC has also proposed an ADRC (Additional Design Requirement and Condition) definition and guidance on its usage that enhances the overall DNCMLS definition and context.⁴⁵ While ADRCs are optional, they are useful to examine the different levels of safety offered by the existing requirements versus that of the changed product relative to the latest requirements. If the changed product is to comply with the existing amendment or intermediate rules including ADRCs and will provide an adequate level of safety that is comparable to the latest requirements, the FAA may find that compliance to the latest requirements “does not contribute materially to the level of safety.”

APPROACH:

The ARC recommends that the FAA revise the definition in AC21.101-1B Section 3.10.1 and Appendix J:

Bringing the certification basis up to the latest amendment of a regulation does not contribute materially to the level of safety when the intended safety benefit of the latest amendment has limited effectiveness when applied on a particular product.

⁴² Changed Product Rule Aviation Rulemaking Committee, *Changed Product Rule Industry White Paper: “Impractical” and “Does Not Contribute Materially to the Level of Safety” Exceptions In 21.101* (2024).

⁴³ Changed Product Rule Advisory Rulemaking Committee, International Authorities Working Group, *Response to Changed Product Rule Industry Task Force White Paper* (March 5, 2024).

⁴⁴ MITRE, *Study of Type Certification Reform and Section 136 of the Aircraft Certification Safety and Accountability Act*, (March 2022).

⁴⁵ See REC A14 of this addendum.

REC A14 - Impractical

RECOMMENDATION:

The FAA should revise definition of “impractical” as described in the approach section below.

RATIONALE:

The ARC was tasked with providing a definition for the term “impractical.”

The following definition takes into account past work, including the industry white paper: “Changed Product Rule Industry White Paper: ‘Impractical’ and ‘Does Not Contribute Materially to the Level of Safety’ Exceptions In 21.101.”⁴⁶ The ARC also considered the recommendations in MITRE report “Safety and Accountability Act” dated March 2022.⁴⁷

APPROACH:

The ARC recommends that the FAA revise the definition in AC21.101-1B Section 3.10.1 and Appendix J:

Compliance with a later amendment may be considered impractical when it would necessitate additional changes to the design or compliance activity that would introduce technical risk and complexity not already present in the product or would involve a level of effort beyond the scope of the intended design change without resulting in a commensurate increase in the level of safety of the product. The applicant must justify that an adequate level of safety is achieved without implementing the changes that would fully comply with the latest amendment.

⁴⁶ IAWG CPR Team Response to Changed Product Rule Industry Task Force White Paper (March 5, 2024).

⁴⁷ MITRE, *Study of Type Certification Reform and Section 136 of the Aircraft Certification Safety and Accountability Act*, (March 2022).

REC A15 - Reference Type Design

RECOMMENDATION:

The FAA should update the definition of the reference type design used for substantial determination under 14 CFR 21.19.

INTENT:

To clearly document the definition of the reference type design (RTD) used for the assessment of when a change or accumulation of changes from that product configuration rises to the level of substantial under § 21.19 thereby requiring a new type certificate. Predicate the RTD definition on this recommendation, which modifies REC2 from the original ARC report.⁴⁸ Clarify that a type certificate (TC) may have multiple designated RTDs and describe the high-level process by which the FAA and design holders can designate and manage RTDs for a type certificate.

RATIONALE:

The ARC communicated in the original report that it does not generally favor the implementation of the RTD concept; however, the original ARC final report provided recommended considerations for exceptions that could improve its favorability. The new recommendation provided herein is made recognizing the IAWG Report Recommendation 1A2 and continued feedback from the IAWG that the airworthiness requirements applicable to an RTD shall align with a given amendment level without any exceptions/reversions to earlier amendments. Additionally, the IAWG recommended that the RTD concept be introduced into Part 21 regulation. It is important to industry to ensure separation of the applicable RTD airworthiness requirements amendment level from that of the certification basis based on the effective date of application for a change under § 21.101 and from the definition of the baseline product used in the determination of the § 21.101 certification basis. This is imperative given that a large portion of significant product level changes cannot be completed in the application period prescribed by § 21.101(e). Holding the amendment level required for an RTD to that of the effective date of application under § 21.101(e) would have potentially large-scale commercial consequences that may result in planned safety advancements not being realized.

In discussions within the ARC and with IAWG members, the ARC understands that the intended safety benefit is obtained when an entire product has been demonstrated to comply with a later amendment that adequately addresses hazards which have evolved over time such that it is representative of a new TC. It is then important to separate this from procedural challenges of the type certification process with fixed application dates and application durations.

The ARC debated the need to protect a proposed RTD from becoming no longer acceptable because of a change in application date and how best to procedurally accomplish that. The IAWG members' position is that, for an RTD to be acceptable, it must be shown compliant to the airworthiness requirements at an agreed amendment level for the whole product without exception/reversion (§ 21.101(b)).

The compromised approach documented in this recommendation is seen as a way forward.

⁴⁸ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 19].

APPROACH:

If the FAA proceeds with a revision to 14 CFR part 21 and guidance material to implement the concept of the RTD, then the ARC recommends modifying REC2 of the original ARC report using the approach described below.

The FAA should add the following revised definition of the RTD to § 21.1(b) to avoid confusion and promote a common understanding of RTD in the new regulatory framework.

Reference Type Design (RTD) is a product design configuration:

- for which compliance of the whole product is documented with a certification basis acceptable to the FAA,
- against which changes must be assessed for determining whether compliance with the provisions of 14 CFR 21.19 “Changes requiring a new type certificate” would be required.

The FAA should ensure that the policy and guidance material utilizes the revised definition of the statement “certification basis acceptable to the FAA” in the revised definition of RTD above:

In establishing an additional RTD configuration, a certification basis acceptable to the FAA is one in which the airworthiness standards are represented with a single amendment across the entire product. That ‘single amendment’ should be consistent with the original date of application for certification of the significantly changed product configuration. Also, that ‘single amendment’ should not be confused with that prescribed by § 21.101, although they may be the same for certain particular cases. As with the requirements for a new TC, equivalent level of safety findings, exemptions, and special conditions (SCs) would be allowed.

In addition, the ARC recommends that the FAA document, in policy and guidance materials, the following important ground rules for the implementation of the RTD concept:

- Multiple RTDs are allowed to coexist on a TC.

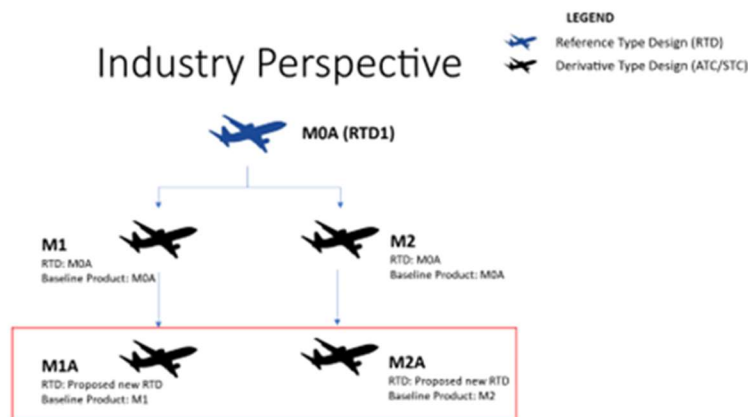


Figure 1: Product family tree

- The request for a configuration to be accepted by the FAA as an RTD can be independent both in communication and timing from the application for type certification of the configuration that is to become the RTD.

There are two cases:

- The applicant may request the determination of a new RTD as part of an application for a product change (M1A or M2A per figure 1)
- The applicant may apply for updated certification of a previously certified product configuration to “a certification basis acceptable to the FAA,” to create a new RTD designation.

The recommended definition of RTD, above, does not include what does and what does not constitute an acceptable demonstration of compliance for the purpose of satisfying the RTD.

Generally speaking, and per the definition above, the proposed new RTD covers the compliance demonstration of the product configuration selected (M1A or M2A) against the airworthiness standards at the amendment applicable for this product.

This general approach should be further refined as follows:

1. Evolution of the Certification Basis of the baseline product

In the case of the certification of a significant product level change for which the certification project exceeds the application period, the applicable amendment for certification will be required to be updated.

In such case, the original date of application for approval of the product level change that is classified as a significant change under § 21.101 may be used for the proposed RTD configuration. In this case, compliance must be demonstrated to the corresponding amendment level for the entire product (Figure 2).

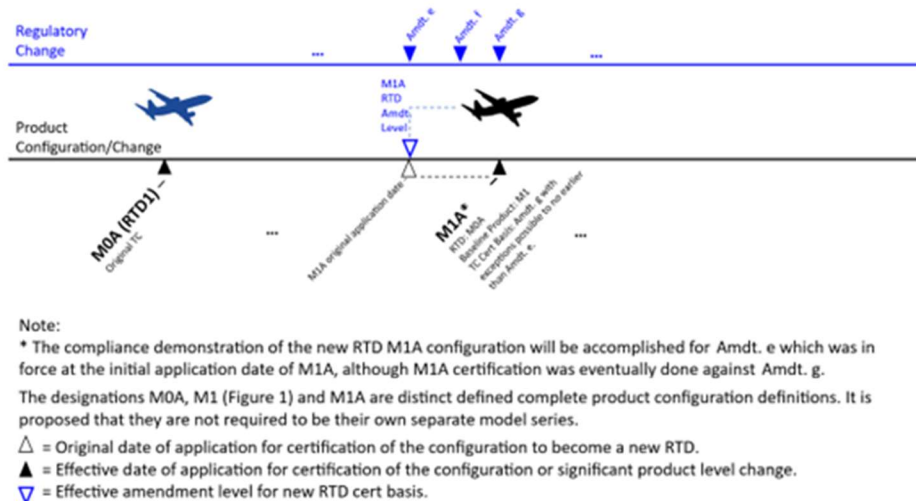


Figure 2: Initial significant product level change configuration is proposed as a new RTD.

2. New RTD designation based on a previously certified product configuration
In such cases, the following rules need to be considered:

- The request for designation of a new RTD should be covered under a new major change application per § 21.97 whether a new demonstration of compliance to “a certification basis acceptable to the FAA” is required.
- The compliance demonstration is based on an understanding that the policies and guidance applicable at the time of original application for certification of the configuration would remain applicable.
- Where the new compliance demonstration relies on evidence / test specimens that are not available anymore, it is the applicant’s responsibility to recreate the necessary evidence to support the compliance demonstration.
- Changes may be needed to the proposed configuration to support compliance with the certification basis.

These changes may be needed based on:

- In service experience leading to mandate changes to the baseline product as initially certified
- Compliance with Part 26 or other airworthiness mandates & regulations
- Need to remove exceptions accepted for the baseline product

These changes should be limited to those needed to support compliance with the RTD certification basis. Some of these changes may have already been certified as post TC changes (Figure 3)

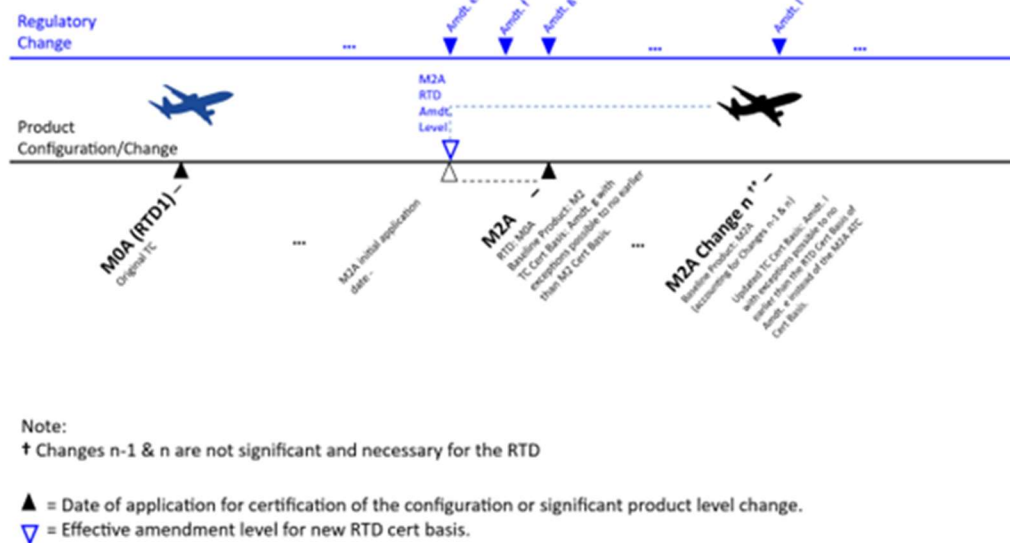


Figure 3: New RTD configuration is one in which n (one or more) major changes have been made following a significant product level change.

Some of these changes may not yet be certified, in which case they will be covered through the certification exercise supporting the new RTD designation request.

Example 1: The simplest example is a request for a new RTD for an amended TC (M1A in Figure 1) either concurrently with or after its amended type certificate (ATC) when the whole product is shown compliant to the applicable amendments for the effective date of application for the ATC.

Study case: New M1A aircraft model embedding new engine type with enhanced performance/fuel consumption.

New engine is heavier and has a larger fan, implying an impact at aircraft level on

- Flight characteristics
- Loads
- Aeroelasticity
- New propulsion installation, including new pylon and wing interface
- Local adaptation of existing systems

Application done in Feb 2023 with a TC Target by December 2027.

- Applicable code is 14 CFR part 25 up to amendment 25-148 (issued in January 2023).

ATC: New M1A model ATC is carried on against part 25 up through amendment 25-148 without exceptions.

New RTD: Either concurrently with application for ATC or sometime after ATC of the Model M1A, a new RTD for the Model M1A original configuration is requested by the applicant against part 25 amendment 25-148. As a full demonstration of compliance to amendment 25-148 for the product was accomplished at ATC, the request for M1A as a new RTD is accepted by the FAA.

- The TCDS is updated to reflect that the Model M1A is the designated RTD for subsequent changes to Model M1A and to record the values of all key parameters of the objective criteria. Applicable configuration is that of the original M1A model.

Example 2: New RTD is requested for a new amended TC where the original date of application and the effective date of application for the change are not the same. (M1A in Figures 1 and 2).

Study case: New M1A aircraft model embedding new engine type with enhanced performance/fuel consumption.

New engine is heavier and has a larger fan, implying an impact at aircraft level on

- Flight characteristics
- Loads
- Aeroelasticity
- New propulsion installation, including new pylon and wing interface
- Local adaptation of existing systems

Application done in Feb 2023 with a TC Target by December 2027.

- Applicable code is part 25 up through amendment 25-148 (issued in January 2023).

A new RTD for the Model M1A configuration is requested in parallel of the new model certification, with the airworthiness standards for the RTD of part 25 up through amendment 25-148. This is based upon the original date of application for the significant change. Once compliance has

been determined for the whole product to the RTD certification basis, it can be identified as the RTD on the TCDS.

Part way through the certification project, TC target of the new M1A model is postponed to December 2029. Therefore, the reference application date for ATC project is updated to Feb 2025.

- Applicable ATC amendment level becomes part 25 up to amendment 25-152 (issued in September 2024).

Notwithstanding, the RTD remains fixed to part 25 up through amendment 25-148, i.e., that RTD amendment level is not based on the effective application date, rather it is based on the original date of application of the significant change for the purpose of establishing a new RTD configuration.

- **Consequences of new applicable amendment level for ATC**

Part 25 amendments 25-149, 25-150, 25-151 and 25-152 become applicable to the changed and affected areas per § 21.101.

Focusing on part 25 amendment 25-152, updated § 25.1309 becomes applicable.

- Impact on the new aircraft model is quite limited: new propulsion control systems can be developed against § 25.1309 at amendment 25-152, however, local adaptation of existing systems do not add capacity or capability, nor commensurate safety benefit and therefore a DNCMLS exception is sought from § 25.1309 at amendment 25-152 as complying with § 25.1309 at amendment 25-152 would not contribute materially to the level of safety of the product.
- The applicable amendment for the new RTD designation remains at amendment 25-148.

ATC: New M1A model ATC is carried on and ultimately approved and documented on the TCDS as a significant change with a certification basis established per § 21.101 against 14 CFR Part 25 amendment 25-152 with exceptions granted to § 25.1309 amendment 25-148 for the system changes other than the new propulsion control.

New RTD: In the process of completing the ATC, a full demonstration of compliance to amendment 25-148 is documented for the entire product. The applicant proposed and the FAA accepted that those areas for which compliance was shown to amendments above 25-148, compliance is accepted without additional showing specific to amendment 25-148.

- Applicable configuration is identical to the new M1A model
- RTD designation is based on:
 - Demonstration of compliance against amendment 25-148 for the areas unchanged, and thus not addressed for ATC approval of new M1A model
 - FAA acceptance of the compliance showing done for the ATC against amendment 25-152 for the areas changed by the new M1A model without further showing as proposed by the applicant at time of revised application for ATC and agreed by the FAA.

Example 3: A new RTD for the Model M2A configuration Change n (Figures 1 and 3) is requested for an existing ATC model, however one or more changes to the product configuration are required to demonstrate compliance across the whole product to the RTD amendment level.

Study case: M2A aircraft model embedding new engine type with enhanced performance/fuel consumption.

New engine is heavier and has a larger fan, implying an impact at aircraft level on

- Flight characteristics
- Loads
- Aeroelasticity
- New propulsion installation, including new pylon and wing interface
- Local adaptation of existing systems

Application done in Sep. 2016 with an ATC date of Aug. 2023.

Applicable code is part 25 up through amendment 25-143 (effective in Aug. 2016).

Compliance was shown and found for the whole product to a certification basis of 14 CFR Part 25 up through Amdt. 25-143 with the following exceptions at the pre-amendment 25-142 levels of the base product M2 as these were unchanged and unaffected by the M2A changes.

Section 25.851 Amdt. 25-74

Section 25.855 Amdt. 25-123

Section 25.857 Amdt. 25-93

Note: At Amdt. 25-143, the latest amendment of §§ 25.851, 25.855 and 25.857 is Amdt. 25-142.

Subsequent to the M2A ATC, the applicant made two changes (n-1 & n) to bring all areas of the product subject to sections 25.851, 25.855 and 25.857 into compliance with Amendment 25-143. The second of these two changes (n) is concurrent with the application for the RTD designation of this configuration.

Given the demonstration of compliance previously of the whole product to the M2A ATC certification basis and the demonstration of compliance for the areas previously excepted to amendment 25-143, the M2A configuration, including changes n-1 and n, is recorded in the TCDS as certified with an ATC certification basis up through Amdt. 25-143 without exception; and the FAA designated M2A configuration, including changes n-1 and n, as the RTD for any subsequent changes to that configuration for evaluation of substantial change. This configuration needs to be clearly distinguished in the TCDS from that of M2A.

REC A16 - Additional Design Requirements and Conditions

RECOMMENDATION:

The FAA should update § 21.101(b) and AC 21.101-1B to formally define additional design requirements and conditions (ADRCs) and provide guidance on its usage.

INTENT:

The ARC was tasked to formally establish the use of additional design requirements and conditions in support of exceptions under § 21.101(b)(3), develop proposed rulemaking language to codify their usage, and to ensure their compliance with the Administrative Procedure Act (APA). The ARC recommends three parts for FAA action:

- a. Define ADRC.
- b. Codify ADRC usage via § 21.101(b)(3) rulemaking.
- c. Update AC 21.101 with ADRC definition and guidance.

The sections that follow are organized per the a., b., c. schema. Please note that REC A21 of this report addresses APA compliance for § 21.101(b)(3) exceptions, including ADRCs.

RATIONALE:

- a. Current FAA directives and guidance lack direct reference to ADRC as a formal term. In the current AC 21.101-1B, Process Step 7 alludes to “design features” exceeding the existing requirements that can be used as a basis for granting § 21.101(b)(3) exceptions; however, the AC does not describe the logic on how the design features support justification for the exceptions or how they translate to certification basis requirements. To set scope and direction on parts b. and c., a proposed ADRC definition is presented in the Approach section below.

In AC 21.101-1B, exceptions under § 21.101(b) are evaluated against three different levels of requirements: “existing,” “earlier,” and “latest.” These terms are defined in AC Appendix J, Definitions and Terminology, as follows:

Existing Certification Basis [for Existing Requirements]: The requirements incorporated by reference in the type certificate of the baseline product to be changed.

Earlier Requirements: The requirements in effect prior to the date of application for the change, but not prior to the existing certification basis.

Latest Requirements: The requirements in effect on the date of application for the change.

The ARC notes that *latest requirements* is applied in the context of the certification application date per § 21.101(a) and does not pertain to out-of-scope requirements released afterwards. Figure 3-1 of AC 21.101-1B, the CPR flow chart repeated in Figure 4 below, maps the three different requirement levels as distinct nodes. Not affected exceptions under § 21.101(b)(2) permit compliance to *existing requirements*, whereas not significant

exceptions under § 21.101(b)(1) and does not contribute materially to the level of safety (DNCMLS) and Impractical Exceptions (IE) under § 21.101(b)(3) permit compliance to *earlier requirements*, which is inclusive of *existing requirements*.

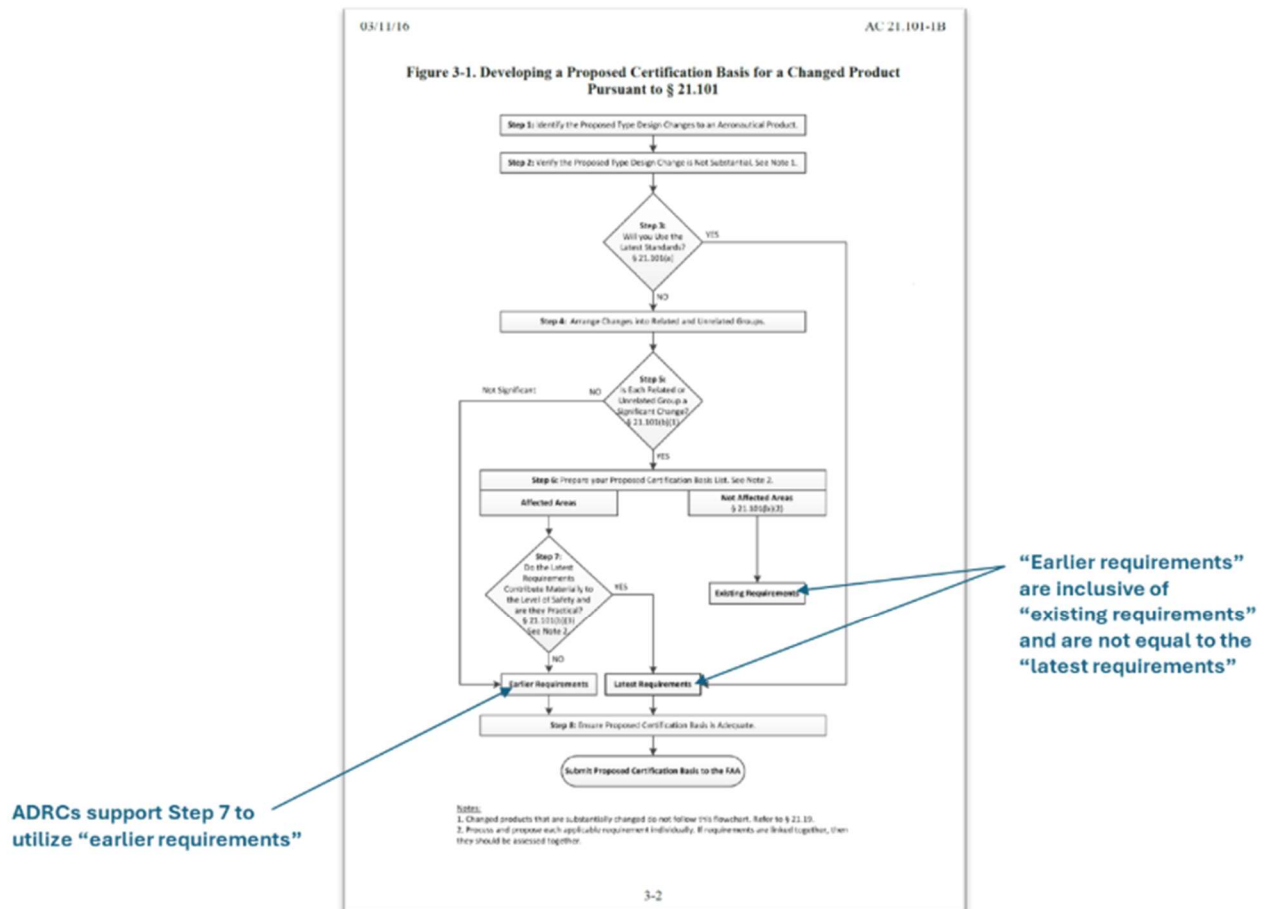


Figure 4: Existing, Earlier, Latest Requirements on the CPR Flow Chart

In a significant change certification project with a defined changed and affected area, DNCMLS exceptions may be granted if compliance to the *latest requirements* does not contribute materially to the level of safety. Impractical exceptions (IE) may be granted if compliance to the *latest requirements* does contribute materially to the level of safety but is not practical. The assessment of DNCMLS and IE compares the relative levels of safety from the existing requirements to the latest requirements *as the latter applies to the changed product*, wherein the FAA may determine it is safe to comply with the *existing requirements* or to a higher, intermediate level with an *adequate level of safety*. The *adequate level of safety* may be met by the changed product's design features or conditions that comply with *existing requirements*, or *earlier requirements* (e.g., requirements released after the baseline product certification and before the certification application date), as set by Additional Design Requirements and Conditions (ADRCs). For a significant changed product's affected area, ADRCs may be used to define an *adequate level of safety* to exceed that of *existing* or *earlier*

requirements such that the gap to the *latest requirements* is small enough to grant a DNCMLS or IE. Figure 5 illustrates the comparative levels of safety that different standards provide.

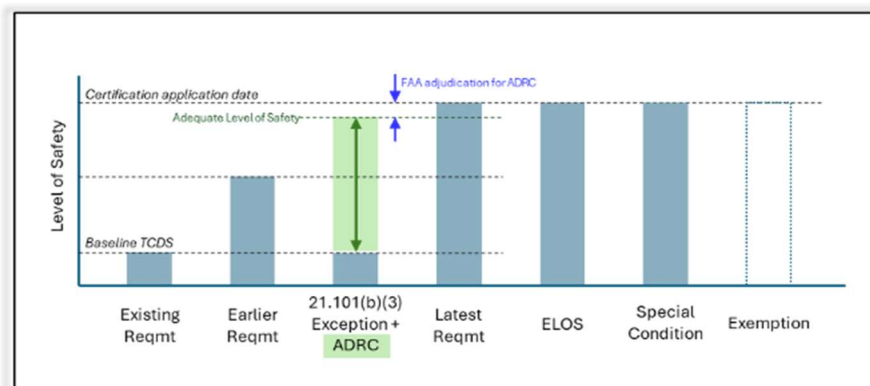


Figure 5: Relative Levels of Safety for Requirements

In Approach c. below, references to *earlier requirements* will be removed from the Figure 5 version proposed for AC 21.101-1C as its inclusion may unintentionally raise default expectations to grant § 21.101(b) exceptions to earlier requirements instead of existing ones.

ADRCs are recognized as a provision similar to § 21.16 Special Conditions (SC) and § 21.21(b)(1) Equivalent Level of Safety (ELOS). For a given significant change project, ADRCs define a level of safety less than that of the latest requirements, whereas SCs and ELOS are intended to define a level of equivalence for the scope of the certification project. ADRCs are not intended to address novel or unusual design features as addressed by SCs. Exemptions permit relief from compliance without adversely affecting safety or providing a level of safety at least equal to that provided by the exempt rule.

The ARC recognizes that ADRCs support either DNCMLS or IE exception types under § 21.101(b)⁴⁹ proposed that DNCMLS and IE be combined into one exception, and industry responded⁵⁰ with its position that DNCMLS “can be used alone without consideration of impracticity.” Given that the FAA’s decision on 1BR1b and its implementation are yet to be determined, this recommendation will define ADRC as it supports both DNCMLS and IE, whether they are combined or remain separate exception types under § 21.101(b)(3).

Recognizing that ADRCs are tailored to a type design and its certification basis, they are of particular applicability and, therefore, are not intended for reuse on other models or by other type certificate holders. In practice, ADRCs are negotiated with particular requirements and conditions that are often based on design features, whether existing on the baseline product or improved on the changed product, that increase the product’s level of safety. When an ADRC is presented as a basis for a § 21.101(b)(3) exception, the FAA may find that the ADRC provides an *adequate level of safety* between rule amendments to grant

⁴⁹ Changed Product Rule Advisory Rulemaking Committee, International Authorities Working Group, *Changed Product Rule Recommendations* (Dec. 19, 2022) [pg. 8].

⁵⁰ Changed Product Rule Advisory Rulemaking Committee, *Changed Product Rule Industry White Paper: “Impractical” and “Does Not Contribute Materially to the Level of Safety” Exceptions In 21.101* (2024).

the DNCMLS or IE exception. ADRC compliance is continually necessary to maintain the exception. If a § 21.101(b)(3) exception with ADRC is granted and is later invalidated by subsequent product changes, the basis for the exception is invalidated as well. Any change or repair to the product that decreases the specified safety level of the ADRC would therefore lead to an invalidation of the exception. Additionally, ADRCs must not contain proprietary or sensitive information as they must be recorded as part of the certification basis on the TCDS or STC.

- b. Although the FAA has historically granted ADRCs, as noted in Joint Authorities Technical Review (JATR) report observation O1.5-A,⁵¹ FAA directives and guidance do not explicitly identify ADRCs; therefore, there is a need to bolster their legal standing to ensure the FAA's authority to utilize ADRCs to grant § 21.101(b)(3) exceptions and also to approve ADRCs as requirements of the type design. The ARC's recommended approach to codify ADRC provisions in § 21.101(b) is below.
- c. JATR recommendation R1.5⁵² states that the "FAA should define and clearly describe the intent and expected use of an ADRC in available guidance," and IAWG recommendation 1BG2⁵³ also "proposes to update the guidance material to further clarify the use and documentation of ADRCs for improved design features in the certification basis." Updated guidance on ADRCs in the AC will serve as a standard reference for all CPR stakeholders by clarifying their purpose, scope, and relationship to § 21.101(b)(3) provisions while reducing ambiguity or conflicting interpretations that arise from informal or inconsistent usage. The updates will also enhance AC 21.101-1B Process Step 7 overall by clarifying how § 21.101(b)(3) exception proposals are evaluated to the existing, earlier, and latest requirements.

APPROACH:

- a. Based on Rationale a. above, the ARC proposes the following ADRC definition:

An Additional Design Requirement and Condition (ADRC) is a requirements provision that ensures an adequate level of safety for the FAA to grant an exception under § 21.101(b)(3) for a design of particular applicability. When seeking a § 21.101(b)(3) exception, the Applicant may propose design-specific ADRCs that describe improved design features, product requirements, or conditions that exceed the level of safety beyond that of the baseline certification basis but not to the latest standards. The FAA may then find the § 21.101(b)(3) exception with the ADRC provides an adequate level of safety. ADRCs must be recorded in the certification basis for a particular type design and are not to be reused on other models.

- b. With ADRC defined in Approach a., the ARC proposes changes to § 21.101(b) to codify ADRCs and their usage. Objectives informing the proposed changes include:

⁵¹ Joint Authorities Technical Review (JATR), *Boeing 737 MAX Flight Control System - Observations, Findings, and Recommendations* (October 11, 2019) [p. 9].

⁵² *Ibid.*

⁵³ Changed Product Rule Advisory Rulemaking Committee, International Authorities Working Group, *Changed Product Rule Recommendations* (Dec. 19, 2022) [p. 9].

- Work within the current 14 CFR part 21 architecture and § 21.101 structure.
- Bolster legal standing of ADRCs as a certification provision and ensure the FAA's authority to utilize it.
- Add ADRCs only as an optional provision to support granting DNCMLS and IE.
- Clarify that § 21.101(b)(3) exceptions may be granted to permit compliance to existing requirements (of the baseline product certification basis) or higher.
- Limit impacts only to § 21.101(b)(3) intent without impacting other part 21 sections, e.g., not significant and not affected exceptions and special conditions (SC).

Thus, the ARC proposes the following changes to § 21.101(b) in [blue underlined text](#).

Section 21.101 Designation of applicable regulations.

- (a) An applicant for a change to a type certificate must show that the change and areas affected by the change comply with the airworthiness requirements applicable to the category of the product in effect on the date of the application for the change and with parts 34, 36, and 38 of this chapter. Exceptions are detailed in paragraphs (b) and (c) of this section.
- (b) Except as provided in paragraph (g) of this section, if paragraphs (b)(1), (2), or (3) of this section apply, an applicant may show that the change and areas affected by the change comply with an earlier amendment of a regulation required by paragraph (a) of this section, and of any other regulation [or provision](#) the FAA finds is directly related. However, the earlier amended regulation may not precede either the corresponding regulation included by reference in the type certificate, or any regulation in §§ 25.2, 27.2, or 29.2 of this chapter that is related to the change. The applicant may show compliance with an earlier amendment of a regulation for any of the following:
 - (1) A change that the FAA finds not to be significant. In determining whether a specific change is significant, the FAA considers the change in context with all previous relevant design changes and all related revisions to the applicable regulations incorporated in the type certificate for the product. Changes that meet one of the following criteria are automatically considered significant:
 - (i) The general configuration or the principles of construction are not retained.
 - (ii) The assumptions used for certification of the product to be changed do not remain valid.
 - (2) Each area, system, component, equipment, or appliance that the FAA finds is not affected by the change.
 - (3) Each area, system, component, equipment, or appliance that is affected by the change, for which the FAA finds that compliance with a regulation described in paragraph (a) of this section would not contribute materially to the level of safety of the product or would be impractical. [The Applicant may](#)

show additional design requirements and conditions for the FAA to find an adequate level of safety higher than that of the baseline product certification basis but not to the latest standards.

Additionally, the ARC recommends that FAA Order 8110.4, Type Certification, expand on the proposed § 21.101(b) updates to explicitly define ADRCs and provide guidance on their usage similar to ELOS and SCs. The FAA's draft Order 8110.4D, posted in 2024, addresses ADRCs in Chapter 2-4, section h.9. The draft text expands ADRC applicability beyond § 21.101(b)(3) exceptions to include all § 21.101(b) exceptions and also extends ADRC usage to address unsafe features or characteristics under § 21.21(b)(2). This broader scope appears inconsistent with guidance provided by the IAWG during Phase 2 working group meetings. Given the draft status of Order 8110.4D, updates are considered outside the scope of the current CPR ARC Phase 2 tasking, and the ARC recommends that the FAA consider this recommendation for the next Order 8110.4 update.

- c. Based on Rationale a. and Rationale b. above, the ARC proposes changes to AC 21.101-1B, fully captured in a markup in the Appendices below.⁵⁴ The recommended changes to AC 21.101-1B incorporate the proposed ADRC definition, associated guidance, and overall enhancement to Step 7 in the CPR Process. The scope of change covers:
- Section 3.10, Step 7 - Do the Latest Requirements Contribute Materially to the Level of Safety and are They Practical?
 - Appendix B, Application Charts for Changed Product Rule.
 - Appendix E, Procedure for Evaluating Material Contribution to Safety or Impracticality of Applying Latest Requirements to a Changed Product.
 - Appendix G, Changed Product Rule Decision Record.
 - Appendix H, Examples of documenting the proposed certification basis list.
 - Appendix J, Definitions and Terminology.

The proposed changes assume that DNCMLS and IE are maintained as different exceptions under § 21.101(b)(3); should the FAA combine DNCMLS and IE into one exception per IAWG proposal 1BR1b,⁵⁵ more comprehensive AC updates will be needed. Note: updates for public review of impractical exceptions, ADRCs, and APA compliance are addressed separately in REC A21 of this report.

⁵⁴ See *infra* Appendix C - Exceptions, "Proposed AC 21.101 -1B Updates."

⁵⁵ Changed Product Rule Advisory Rulemaking Committee, International Authorities Working Group, *Changed Product Rule Recommendations* (Dec. 19, 2022) [p. 8].

B. Affected Areas

1. FAA Request

*Develop a process to define affected areas based on comments provided by the IAWG and the GAMA proposal to establish affected areas (**expand table C-1 on page 44 of the ARC report**⁵⁶) that would apply to any change. (This process should consider the use of previously approved certification data to support the designation of an area as affected or unaffected. Note: the FAA's position is that the extrapolation of data does not exclude an area from being affected.)*

Provide guidance example(s) to support the affected areas proposal. At a minimum, provide an example(s) that includes a change which affects compliance showings for § 25.1309, structural requirements, and other aircraft-level type requirements. The examples should validate the effectiveness of the process when historical certification assumptions may no longer be valid or may require additional validation (such as where system integration may have unique challenges) to ensure an appropriate level of safety is maintained.

⁵⁶ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 44].

2. ARC Recommendations

REC A17 - Revision of 14 CFR 21.19 Terminology: Investigation vs Demonstration

RECOMMENDATION:

The FAA should clarify the regulatory trigger for substantial changes by revising the terminology within 14 CFR 21.19, replacing the phrase “investigation of compliance” with “demonstration of compliance.”

INTENT:

This change seeks to align the regulatory text with standard engineering certification practices and eliminate the conflation of exploratory scoping activities with evidentiary substantiation.

RATIONALE:

Section 21.19 identifies the conditions under which an applicant proposing a design change is required to apply for an entirely new type certificate (TC) rather than an amended type certificate (ATC) or supplemental type certificate (STC). Currently, the rule stipulates that a new TC is required if the proposed change in design, power, thrust, or weight is so extensive that a “substantially complete investigation of compliance with the applicable regulations is required.”

In the context of aeronautical engineering and regulatory oversight, the term “investigation” is problematic. The CPR ARC found that “investigation” is easily confused with preliminary engineering activities utilized to establish the size or scope of an affected area under 14 CFR 21.101, or activities carried out to determine if a change is major or minor under 14 CFR 21.93. An investigation is an exploratory fact-finding mission. Conversely, an applicant seeking FAA approval is fundamentally required to *demonstrate* compliance. Compliance activities serve to collect substantiation data (e.g., flight test data, structural analysis, system safety assessments) for analysis, documentation, and formal submission to the FAA or its designee.

The regulatory distinction is highly consequential. For instance, during the evaluation of major significant change, the regulatory determination of whether a change is “substantial” hinges on whether the general configuration and assumptions used for certification remain valid for the complete aircraft. If a change is substantial, the scope of the required compliance demonstration comprises a complete, top-to-bottom re-addressing of the entire certification basis for all aspects of the product. In contrast, for changes less extensive than a substantial change, the required demonstration of compliance has a narrower scope, applying only to the affected areas rather than the complete type design.

If the rule explicitly uses the term “demonstration,” applicants can directly bound the requirement. A demonstration of compliance entails the generation of specific certification deliverables (e.g., test plans, structural reports) evaluated against applicable airworthiness requirements as they apply to the changed characteristics of the product. By accepting this recommendation, the FAA will provide applicants with unambiguous language that directly links § 21.19 to the generation of compliance artifacts, thereby streamlining the initial determination of whether a modification triggers a new TC.

APPROACH:

The FAA should initiate rulemaking to amend the text of § 21.19, while concurrently updating the explanatory guidance in Chapter 3 of AC 21.101-1B.

Proposed Regulatory Text for § 21.19:

Each person who proposes to change a product must apply for a new type certificate if the FAA finds that the proposed change in design, power, thrust, or weight is so extensive that a substantially complete **demonstration** of compliance with the applicable regulations is required.

Proposed Policy Change for AC 21.101-1B:

To support this regulatory revision, the FAA should insert the following contextual definitions into AC 21.101-1B:

A demonstration of compliance following a change to a type certificate refers to the evidentiary activity required to prove compliance to the applicable requirements in the certification basis as they apply to the changed characteristics of the product. In the case of a Substantial Change, the scope of the demonstration required comprises a complete re-addressing of the entire basis of certification for all aspects of the product. In the case of changes that do not trigger a substantial change classification, the demonstration of compliance will generally have a scope narrower than all elements contained in the certification basis and will only apply to the specific affected areas of the modified type design.

REC A18 - Iterative Methodology for Scoping Affected Areas and Verifying Completeness

RECOMMENDATION:

The FAA should develop and publish within AC 21.101-1B a standardized, continuous, and iterative methodology for identifying, scoping, and verifying the completeness of affected areas.

INTENT:

This methodology utilizes a deterministic four-category framework to evaluate direct effects, indirect cascading effects, and areas requiring investigatory resolution, ensuring completeness checks are driven by strict traceability and safety principles rather than subjective judgements.

This section integrates REC8⁵⁷ and REC10⁵⁸ from the original report to establish a unified, linear proposal that explicitly resolves the August 2025 IAWG feedback regarding completeness checks and process linearity.

RATIONALE:

The applicant must arrange design changes into related and unrelated groups and then determine if each group is “significant” or “not significant.” For significant changes, the areas affected by the change mandate a new demonstration of compliance using the latest regulatory amendments in effect on the date of application.

However, identifying the exact boundaries of these areas affected by the change is historically one of the most contentious aspects of the CPR process. In August 2025, the IAWG explicitly rejected the ARC’s initial proposal for updating affected area methodologies because the ARC mixed the physical/functional scoping of the area with the concepts of practicality and proportionality. The IAWG stated that this conflation is “contrary to the linearity of the CPR process.” The engineering evaluation must remain strictly sequential: an applicant must first determine the affected area based entirely on whether the physical or operational conditions have changed. Only after the area is accurately bounded can the applicant request an exception for impracticality under 14 CFR 21.101(b)(3).

A change to a product influences its characteristics either directly or indirectly. Direct effects are easily identifiable as they encompass intentional physical or functional alterations (e.g., changes in form, material, system architecture, or software logic). Indirect effects occur when the operational or environmental conditions that an unchanged component is exposed to are altered as a cascading consequence of the direct change. Because the characteristics of the baseline product have been modified, the original compliance findings for both directly and indirectly affected areas are invalidated, necessitating a new demonstration of compliance.

A robust completeness check is vital. If an affected area is defined too narrowly early in the project, the discovery of indirect effects late in the certification lifecycle will force a retroactive expansion of the compliance demonstration to achieve an adequate certification basis. As noted by the IAWG, “affected area changes at the later stage of the project would be impactful for the project when developing the process,” leading to severe schedule delays and cost overruns. Therefore, providing

⁵⁷ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 35].

⁵⁸ Ibid.

applicants with a rigorous four-category classification system ensures that no ambiguous areas are left unresolved before the certification plan is accepted.

APPROACH:

The FAA should amend AC 21.101-1B to recommend the following iterative engineering methodology for defining affected areas. The guidance must make clear that an appropriately defined “affected area” includes ALL areas of the product that require a new demonstration of compliance, evaluated through a comprehensive top-down/bottom-up systems engineering approach.

Draft AC 21.101-1B Policy: The Four-Category Affected Area Framework

When establishing the size and reach of the affected area through the use of this methodology, the applicant must decompose the aircraft architecture and classify every component, function, or characteristic into one of four possible categories:

Category	Classification	Engineering Definition & Regulatory Implication
Category 1	Directly Affected	The component, function, or characteristic is directly and intentionally changed. It constitutes the core modification itself. <i>Implication:</i> Clearly part of the affected area; requires a new demonstration of compliance.
Category 2	Indirectly Affected	The component, function, or characteristic is not intentionally altered physically or functionally, but the environmental, structural, aerodynamic, or operational conditions it experiences have clearly changed as a result of the Category 1 modification. <i>Implication:</i> Clearly part of the affected area; requires a new demonstration of compliance.
Category 3	Undetermined Effect	It is initially unclear whether the component, function, or characteristic is indirectly affected by the change. The boundary of the indirect cascading effects has not yet been established. <i>Implication:</i> Requires further investigatory effort (analysis, testing) to resolve into Category 2 or Category 4.
Category 4	Unaffected	The component, function, or characteristic is unaffected by the change. No conditions have been altered. <i>Implication:</i> Excluded from the affected area; the baseline product’s original demonstration of compliance remains fully valid.

Table 1: The Four-Category Affected Area Framework

Draft AC 21.101-1B Policy: Completeness Checks and Iterative Resolution The determination of the affected area is not considered complete until all aspects of the product initially identified as Category 3 have been rigorously resolved as either Category 2 or Category 4. No Category 3 areas may remain unresolved in the final certification plan.

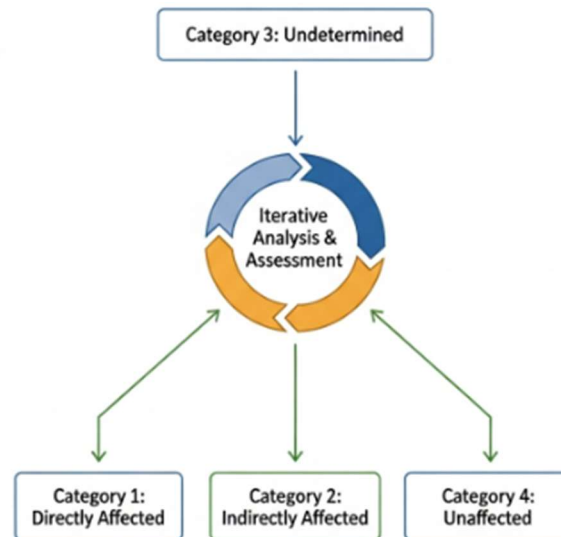


Figure 6: Category 3 Items

To resolve Category 3 items, applicants must perform specific investigatory efforts to establish the precise boundary of the change's effective “reach.” If an applicant possesses the capability to perform engineering investigations (e.g., finite element analysis, computational fluid dynamics, ground testing) to prove that conditions have not deviated from those of the baseline product, those areas may be designated as Category 4, subject to FAA concurrence.

If this investigation is not performed, or if the investigation yields inconclusive results, the area in question automatically defaults to Category 2.

The engineering investigation performed to delimit the scope of the affected areas shall not be confused with a demonstration of compliance with the requirements applicable to the affected areas. However, in many complex systems, it is impractical to execute an investigation proving conditions are unchanged without essentially repeating the full demonstration of compliance itself. In such scenarios, the area defaults to Category 2 and becomes part of the affected area.

Example of Investigatory Completeness Checking (Fixed-Wing Aircraft):

Consider a modification that replaces an existing wing with a new aerodynamic profile on a fixed-wing transport aircraft.

- **Category 1 (Direct):** The entire new wing structure.
- **Category 2 (Indirect):** The fuselage carry-through structure to which the new wing is fastened. The aerodynamic loads transmitted to these attachment points are undeniably different, invalidating the baseline structural compliance.

- **Category 3 (Undetermined):** The fuselage structure located significantly forward or aft of the attachment points.

To resolve the Category 3 fuselage structure, the applicant must conduct an investigation. This could involve finite element modeling or a flight survey gathering strain gauge data along the fuselage during maneuver profiles. If the strain gauge data in the aft fuselage is identical to the data recorded for the baseline product, the applicant has successfully located the physical boundary of the affected area. The aft fuselage is resolved to Category 4 (Unaffected), as the conditions have not changed. If the strain gauge data shows measurable load deviations compared to the baseline, the applicant has not yet found the boundary. The affected area must iteratively expand further forward and aft along the fuselage (reclassifying structure as Category 2) until a zero-deviation boundary is identified.

Draft AC 21.101-1B Policy: Use of Previous Compliance Data

The FAA must explicitly state that the reuse of historical legacy data does not shrink the physical boundaries of an affected area. In certain cases, compliance data generated prior to the design change may have possessed sufficient conservative margin to envelop the new, altered conditions. However, if the physical or operational conditions in the area being analyzed have changed, the area mandates a *new demonstration of compliance* and is therefore part of the affected area. The fact that the applicant satisfies this new demonstration by referencing robust, pre-existing historical data rather than conducting new physical tests is an acceptable means of compliance, but it does not reclassify the area as “Unaffected.”

REC A19 - Addressing Broad Scope of Applicability Requirements and Technical Consistency

RECOMMENDATION:

The FAA should update AC 21.101-1B to introduce formal guidance requiring applicants to iteratively adjust and expand the scope of the initially defined affected area to account for the “broad scope of applicability” inherent to certain airworthiness requirements. The FAA should define technical consistency criteria for the broad scope of applicability requirements to ensure consistent identification of the affected area.

INTENT:

Airworthiness requirements to consider include, e.g., 14 CFR 2x.1309 for System Safety, 2x.571 for Damage Tolerance, and 2x.1302 for Human Factors. Adjustment of the affected area for broad scope of applicability requirements must utilize specific technical consistency criteria.

Note: this section integrates REC9⁵⁹ and REC11⁶⁰ from the original ARC report to address IAWG feedback regarding the separation of affected areas from practicality/proportionality arguments when dealing with aircraft-level requirements.

RATIONALE:

The initial physical/functional scoping of an affected area (identifying Categories 1 and 2 based on direct and indirect physical/functional effects) is a necessary first step, but it is insufficient when the applicable airworthiness requirements are intended to address broad safety issues at system or aircraft level. The airworthiness requirements that comprise the certification basis for the changed product actively influence the ultimate size of the affected area.

Certain regulations inherently possess a “broad scope of applicability,” meaning the regulation’s safety intent extends far beyond a single isolated component. For instance, 14 CFR 25.1309 applies to all aircraft equipment and systems, requiring an evaluation of catastrophic failure conditions at the entire product level. If an applicant replaces a single avionics display in the cockpit, an assessment based purely on physical direct effects might limit the affected area strictly to the display unit, its mounting bracket, and its immediate wiring harness. However, the application of § 25.1309 dictates that the applicant must consider the functional failure of that modified display in the context of how it interacts with the rest of the aircraft. The display’s failure could cascade into other systems or create a misleading alerting scenario that alters the probability of an aircraft-level hazard. Thus, the affected area must be mathematically and functionally expanded to encompass the intended scope of applicability of § 25.1309.

In Phase 1, the ARC attempted to limit the expansion of affected areas under these broad rules by injecting arguments of “practicality” and “proportionality” directly into the scoping exercise. The IAWG flagged this as a dangerous deviation from the linear CPR process, and the ARC agreed. When a regulatory change is introduced, or a new amendment level is triggered, it is imperative to evaluate the full safety scope of the requirement. Simply focusing on areas physically or functionally impacted by the design change undermines the safety intent of the amended requirement.

⁵⁹ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 52].

⁶⁰ Changed Product Rule Aviation Rulemaking Committee, *Final Report* (December 20, 2024) [p. 57].

To maintain linearity and ensure the highest levels of safety, the applicant must first relentlessly expand the affected area using rigorous technical consistency criteria. If the resulting required demonstration of compliance places a disproportionate economic or engineering burden on the legacy architecture, the applicant's recourse is not to artificially shrink the affected area. Instead, the applicant must formally petition for an exception under 14 CFR 21.101(b)(3), demonstrating that applying the latest requirement is impractical or does not contribute materially to the overall level of safety.

APPROACH:

The FAA should incorporate a new sub-section within Chapter 3 of AC 21.101-1B titled “Adjustment of Affected Areas for Broad Scope Requirements.”

Draft AC 21.101-1B Policy: Applying Technical Consistency Criteria

Once the initial affected area is defined based on physical and functional direct and indirect effects, the applicant must map the corresponding airworthiness requirements to those areas. Attention shall be heavily focused on requirements where the intended scope of applicability is broader than the localized demonstration of compliance. To maintain technical consistency with the underlying safety intent of the requirement, the boundaries of the affected area must be adjusted outward.

The method for executing this adjustment relies on applying specific technical consistency criteria, which are highly dependent on the nature of the engineering domain being assessed. The following table includes some common examples of broad scope of applicability requirements and their associated technical consistency criteria:

Airworthiness Domain	Typical Broad Scope Requirements	Technical Consistency Criterion	Methodology for Expanding the Affected Area
Structural/ Fatigue	§ 2x.571 (Damage Tolerance & Fatigue)	Load Path/Load Distribution	A localized physical change (e.g., adding a large cargo door) requires tracking the altered load distribution. The affected area must expand to include all Principal Structural Elements (PSEs) that share the continuous load path to the primary airframe structure.
System Safety	§ 2x.1309 (Equipment, Systems, and Installations)	Failure Conditions/ Functional Chain/Zonal Consistency	A change in one component may alter the severity, probability, or cascading consequences of a specific failure condition. The affected area expands to include all system contributors to that functional failure chain, as well as legacy systems sharing the same physical zone (to assess thermal/vibratory common cause vulnerabilities).

Airworthiness Domain	Typical Broad Scope Requirements	Technical Consistency Criterion	Methodology for Expanding the Affected Area
Environmental Protection	§ 27/29.610 and 25.581 (Lightning Direct Effects),	Propagation Path	The area expands along the entire electrical bonding propagation path to the aircraft ground plane.
	§ 2x.631 (Bird Strike)	Hazard Scenario	The area expands to encompass all components geographically situated within the kinetic trajectory of the bird impact sequence.
Human Factors & Operational	§ 25.1302 (Installed Systems), § 2x.1322 (Alerting), § 2x.1523 (Min Crew)	Cockpit Consistency/ Workload Evaluation Scenarios	A localized software change introducing a new alert cannot be assessed in a vacuum. The area expands to encompass overall cockpit integration philosophy, ensuring the new logic does not negatively impact existing crew situational awareness or cause cognitive overload during emergency scenarios.
Cybersecurity	§ Special Condition (Equipment, Systems, and Networks)	Attack Path Mitigation	Introducing a wireless access point expands the affected area along the entire interconnected digital network. Any legacy flight-critical component sharing a data bus with the new asset becomes part of the assessment scope to mitigate lateral attack movement.
Electrical Wiring (EWIS)	§ 2x.1353, § 25.1701	Interconnected Functions/EMI	The routing of new cables mandates the expansion of the affected area to include all interconnected legacy wiring bundles to assess electromagnetic interference (EMI) and physical chafing hazards.

Table 2: Technical Consistency Criteria

A new or revised airworthiness requirement introduced by the latest amendment is not cause for expanding the affected area *only* if the requirement's applicability is clearly and demonstrably beyond the direct and indirect physical/functional effects of the modification. For example, if an applicant upgrades comprehensively the flight deck, triggering safety assessment of all instruments display functions under amended §2x.1309, they are not required to reassess the safety of the landing gear actuation system against the latest amendments, as the landing gear is completely outside the functional chain and hazard scenarios of the flight deck instruments.

REC A20 - Revise § 21.101(b)

RECOMMENDATION:

The FAA should revise 14 CFR 21.101(b) to remove the influence of later amendments in the determination of significance.

INTENT:

There is a need to clearly establish an adequate certification basis for product changes and remove the subjective influence that later amendments may have on the determination of whether a change is significant.

Using the approach below, later amendments would not influence whether a change is significant, and it clarifies that later amendments could be applied when earlier amendments are deemed inadequate (e.g., 29.865 amendment 29-43 for Human External Cargo) or where new standards have been introduced (e.g., 14 CFR 25.1317 “High-Intensity Radiated Fields Protection” or 14 CFR 25.1316 “Electrical and electronic system lightning protection”).

RATIONALE:

The IAWG has indicated that the nature of later amendments to airworthiness standards should be used as an additional means to lead to a determination of significance when the currently used significance criteria may fail to do so in consideration of the extent of the design change alone. The IAWG presented the following explanation:

When the applicable airworthiness standards for a product under § 21.101(a) are revised or new standards are introduced that increase the intended safety level, and the design change affects the area covered by those updated standards, the original assumptions used for certification may no longer be valid. This aligns with the principle in § 21.19, where a change affecting an entire technical area (such as a system, compartment, lifting device, structure, or flight characteristics) is considered sufficiently extensive to require a substantially complete reassessment of compliance for that area.

Examples:

- Fuel Tank Safety § 25.963(e). When a wing is changed, the later amendment may invalidate the original assumptions used for certification.
- Flight Crew Alerting § 25.1322. When an avionics suite is changed in its principles and human-machine interface, the later amendment may invalidate the original assumptions used for certification.

The ARC believes the assertion by the IAWG is to be a means to ensure that, when new or amended standards are introduced to address new or different types of hazards, they need to be considered in development of the certification basis for a change.

The following presents the ARC’s rationale as to why later amendments to airworthiness standards should not be used in the determination of significance.

1. Current and historical CPR practice has not produced examples where the nature of later amendments to airworthiness standards has caused a product change to be significant when the extent of the change itself did not constitute a product level

change and failed to meet the significance criteria on its own. Historically, assumptions used for certification, one of the three determinants for significance, have consistently been applied in a backward-looking manner. Only the extent of the change has been assessed against the original assumptions used for certification for the baseline product, without consideration of later amendments. This is further illustrated by the examples of significant changes contained within Appendix A of AC 21.101-1B that only address the three determinants for significance.

2. Regulatory language and guidance is inconsistent regarding whether later amendments drive a change to be significant:
 - The preamble to amendment 21-77 indicated that later amendments will be considered in the determination of significance *...in determining whether a change is significant, the **FAA will consider the latest amendments** to the airworthiness standards adopted after the most recent type certification basis* (emphasis added).⁶¹
 - This is consistent with 14 CFR 21.101(b)(1), which states, “*In determining whether a specific change is significant, the FAA considers the change in context with **all previous relevant design changes** and all related revisions to the applicable regulations incorporated in the type certificate for the product*” (emphasis added).
 - That said, AC 21.101-1B (Section 3.6.2) contradicts these statements by stating in part:

Design change cannot be classified or re-classified as a significant change on the basis of the importance of the later amendment.

This may have been written to prevent a clearly otherwise not significant change from being classified as significant solely on the perceived importance of the rule change.

3. Established legal mechanisms allow authorities to impose important safety standards on new products and, when necessary, apply them retroactively (e.g., part 26, 14 CFR 25.2, 14 CFR 21.101(d)). These mechanisms have been invoked when there was a clear need to address new threats.
4. If significance is determined by the perceived safety impact of later amendments to airworthiness standards (as implied in § 21.101(b)(1)), there would need to be a means whereby the impact of later amendments could be predictably and consistently applied by the authorities. Without invoking the existing mechanisms to apply the intent of later amendments (e.g., part 26, §§ 25.2, 21.101(d)), there is risk that decisions to trigger significance based on the nature of later amendments could be arbitrary and highly inconsistent within and between authorities.

⁶¹ Type Certification Procedures for Changed Products NPRM, 65 FR 36244, 36255 (June 07, 2007).

5. Unnecessarily driving changes to “significant” could lead to the inhibiting of safety enhancements due to their becoming cost prohibitive or completely impractical if forced to comply with later amendments. If one airworthiness standard at a later amendment would cause a change to be significant, it would drive all airworthiness standards applicable to the affected area be applied at their latest amendment, thus placing them all at an effectively equal level of perceived importance. Driving all applicable airworthiness standards to the latest amendment could prevent or discourage applying safety improvements to older products.
6. Notices of proposed rulemaking (NPRMs) have not included an assessment of how a proposed amendment may impact a determination of significance. Using the nature of later amendment itself as a determinant of significance creates the burden to measure, in some way, the importance of a particular amendment.
7. When airworthiness standards are not harmonized between authorities, a validating authority may want to reclassify a change as significant during validation. This would contradict the primary certifying authority’s “not significant” determination and conflict with established principles of product validation. Such misalignment can lead to extended validation timelines, configuration differences between authorities, and increased costs for applicants.
8. Per AC 21.101-1B (Section 3.6.1), significant changes are product level changes. Applying the principle that a later airworthiness standard amendment could drive a change to be significant contradicts this principle.

To ensure the certification basis that is established for a change is adequate, amendments to airworthiness standards need to be considered in the change process. Step 8 of the CPR process in AC 21.101-1B (applicable to both significant and not significant changes) talks extensively about the need to ensure that the proposed certification basis is adequate (AC 21.101-1B, Figure 3-1 and Section 3.11).

As per Section 3.11, a certification basis is adequate when:

- *The airworthiness standards provide an appropriate level of safety for the intended change, and*
- *The change and the areas affected by the change do not result in unsafe design features or characteristics for the intended use.*

Section 3.11.1 explains that, if later applicable airworthiness standards do not address novel or unusual design features, the FAA will develop special conditions, but the FAA will impose later airworthiness standards that contain adequate or appropriate safety standards in lieu of special conditions (High-intensity radiated fields and lightning are used as examples where the later standards could be imposed for not significant changes). See also Section 3.11.3 and 3.11.4.

3.11.3 In cases where inadequate or no airworthiness standards exist for the change in the existing type certification basis but adequate standards exist in a later amendment of

the applicable airworthiness code, the later amendment will be made part of the type certification basis to ensure adequacy of its certification basis.

- 3.11.4 *The FAA determines the final certification basis for a product design change. This may consist of a combination of those airworthiness standards ranging from the existing certification basis of the baseline product to the latest amendments and special conditions.*

Looking at the wording of § 21.101(a) and (b) as revised at amendment 21-77, the need to ensure that the certification basis for a change includes adequate standards is no longer explicitly stated. Section 21.101(b) prior to amendment 21-77 stated:

*(b) If the Administrator finds that a proposed change consists of a new design or a substantially complete redesign of a component, equipment installation, or system installation, and that the regulations incorporated by reference in the type certificate for the product **do not provide adequate standards** with respect to the proposed change, the applicant must comply with—*

(1) The applicable provisions of this subchapter, in effect on the date of the application for the change, that the Administrator finds necessary to provide a level of safety equal to that established by the regulations incorporated by reference in the type certificate for the product.... (emphasis added).⁶²

The NPRM for amendment 21-77 stated the provision to ensure adequate standards *would no longer be needed...because proposed Sec. 21.101(a) would require the use of later regulations.*⁶³ What has been historically understood is that the exceptions under § 21.101(b) could be used such that all applicable standards revert to the certification basis of the baseline product when a change has been determined to be not significant, presumably due to the language in § 21.101(b) that does not explicitly consider the adequacy of the earlier amendments, which was not the original intent.

APPROACH:

In consideration of the above, the ARC does not feel that the nature of the amendments to airworthiness standards should be used to classify a type design change as significant as there are other means that can be used to ensure an adequate certification basis.

As such, the ARC recommends the following change to § 21.101(b) to ensure that later amendments are considered if earlier amendments are determined to be inadequate and remove the influence of later amendments in the determination of significance. Edits in blue underlined text.

(b) Except as provided in paragraph (g) of this section, if paragraphs (b)(1), (2), or (3) of this section apply, an applicant may show that the change and areas affected by the change comply with an earlier amendment of a regulation required by paragraph (a) of this section unless earlier amendments are determined to be inadequate, and of any other regulation the FAA finds is directly related. However, the earlier amended regulation may not precede either the corresponding regulation included by reference in the type certificate, or any regulation

⁶² See 14 CFR 21.101 Amendment 21-69 (Effective Sept. 16, 1991).

⁶³ Type Certification Procedures for Changed Products NPRM, 62 FR 24288, 24295 (May 2, 1997).

in §§ 25.2, 27.2, or 29.2 of this chapter that is related to the change. The applicant may show compliance with an earlier amendment of a regulation for any of the following:

(1) A change that the FAA finds not to be significant. In determining whether a specific change is significant, the FAA considers the change in context with all previous relevant design changes ~~and all related revisions to the applicable regulations~~ incorporated in the type certificate for the product.

Changes that meet one of the following criteria are automatically considered significant:

(i) The general configuration or the principles of construction are not retained.

(ii) The assumptions used for certification of the product to be changed do not remain valid.

Further, the ARC recognizes that Step 8 of the CPR process in AC 21.101-1B Section 3.11 may need to be revisited in light of the proposed change to § 21.101(b) to ensure that important revisions to applicable regulations are considered when establishing an adequate certification basis.

C. Exceptions

1. FAA Request

Develop proposed rulemaking to address exceptions under § 21.101(b)(3), to include a proposal to ensure approval of an impractical exception only after providing public notice and opportunity to comment.

Validate the effectiveness of proposed rulemaking / process using examples, both historical and any future proposals that the ARC finds appropriate and in consideration of other exceptions (not affected, does not contribute materially to the level of safety, not significant). Examples should be included in the report or other associated documentation provided to the FAA.

If additional design requirements and conditions (ADRCs) will be used within the exception process, propose rulemaking language to codify their usage to comply with the Administrative Procedure Act (APA).

2. ARC Recommendations

REC A21 - Public Notice and Comment on Impractical Exceptions and Additional Design Requirements and Conditions

RECOMMENDATION:

The FAA should provide a process framework in the preamble to the final rule notice amending § 21.101 to address the need for public notice and comment on impractical exceptions and additional design requirements and conditions granted under § 21.101(b)(3).

INTENT:

The ARC was tasked to propose rulemaking to ensure approval of § 21.101(b)(3) impractical exceptions (IE) only after providing public notice and opportunity to comment. The ARC recommends the agency describe the process framework in the preamble to the final rule notice that amends § 21.101 to require public notice and the opportunity to comment on proposed IEs and associated design requirements and conditions (ADRCs) – hereinafter referred to as IE/ADRC – with supporting processes and guidance.

RATIONALE:

In a significant change certification project, any exceptions granted under § 21.101(b) have particular applicability to a specific type design and thus are not subject to the public notice and comment requirements under the Administrative Procedure Act (APA). However, Section 344(a)(1) in the FAA Reauthorization Act of 2024 directed the FAA to propose rulemaking to require public notice and comment of IEs before approval to provide greater transparency on this area of certification basis development.⁶⁴ The ARC's tasking also addresses ADRCs, which may accompany IEs, for consideration and compliance with the APA. A review of the certification provisions under § 21.101(b) for exceptions, § 21.16 for special conditions (SC), § 21.21(b)(1) for equivalent level of safety (ELOS), etc., is needed to establish context, precedent, and the recommended approach for the FAA to propose rulemaking requiring public notice and the opportunity to comment on IEs/ADRCs.

APPROACH:

The APA under 5 U.S.C. §§ 551–559 governs the procedures federal agencies must follow when issuing rules or adjudicating cases. Actions taken by federal agencies that have a substantive, binding effect may take the form of rulemaking or adjudication that generally correlate with, and are often defined by, their applicability to broad classes versus specific parties.⁶⁵ Figure 7 illustrates APA coverage for certification basis options of particular applicability, including § 21.101(b) exceptions, ELOS or Equivalent Safety Findings (ESF), SCs, and exemptions.

⁶⁴ FAA Reauthorization Act of 2024, Public Law 118-63, Sec. 344 (a)(1) (May 16, 2024).

⁶⁵ Ben Harrington & Daniel J. Sheffner, *Informal Administrative Adjudication: An Overview*, Congressional Research Service (Oct. 1, 2021).

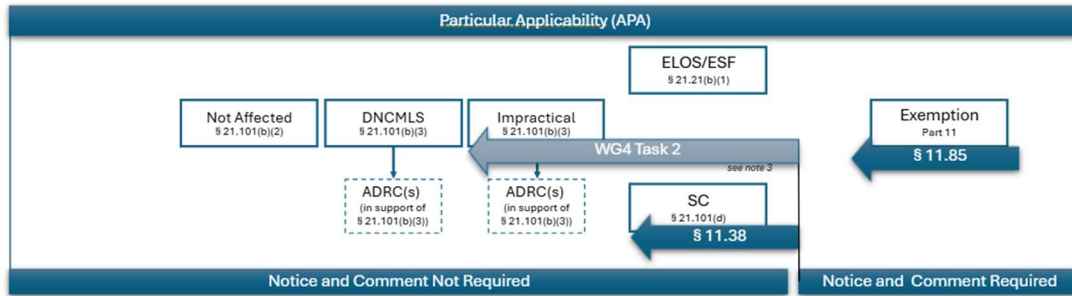


Figure 7: APA Coverage for Certification Basis Options, Current State

Given that a certification basis is tailored to a specific application for a new or changed aeronautical product, all § 21.101(b) exceptions and ELOS have particular applicability to a specific party or design per interpretation of 5 U.S.C. § 551 and thus are not subject to the APA public notice and comment requirements. Although SCs also have particular applicability when developed initially to support a certification application, their re-usability to other models and manufacturers drives general interest. The FAA determined this interest necessitates public notice and comment and established procedures for such that are outlined in § 11.38. Similarly, exemptions that provide relief from compliance with certain provisions have particular applicability to a specific party and are not subject to the notice and comment requirements of the APA, but the FAA has established procedures for soliciting public input in § 11.85 to assist the agency in evaluating petitions for exemptions. These categories for certification basis options are mapped in Table 3 below.

APA Applicability	APA Rulemaking	APA Action	Cert Basis Option	Public Notice and Comment Needed
General	Yes	Informal Rulemaking	Substantive rules	Yes 5 U.S.C. § 553 (APA)
Particular			Exemption	Yes (§ 11.85)
			Special Condition	Yes (§ 11.38)
	No	Informal Adjudication	Impractical exception	Yes
			Impractical exception / ADRC	(FAA Reauthorization Act of 2024, Section 344(a)(1))
			DNCMLS exception	No
			DNCMLS exception / ADRC	
			Not Affected exception	
			Not Significant exception	
			ELOS	

Table 3: Certification Basis Options Map

Substantive rules, SCs, and exemptions go through notice and comment. Substantive rules are administered via informal, legislative rulemaking procedures in accordance with 5 U.S.C. § 553 for rules of general applicability, whereas exemptions go through notice and comment in accordance with § 11.85, and SCs go through notice and comment in accordance with § 11.38. Currently, § 21.101(b) exceptions and ELOS are administered via informal adjudication per FAA procedures for particular applicability. Though the FAA Reauthorization Act of 2024 directs the FAA to require public notice and comment before approval of IEs, section 344 of the Act does not require IE/ADRC to be “on the record after opportunity for agency hearing” as prescribed in 5 U.S.C. § 554 to require formal adjudication. Sections 554, 556, and 557 require oral, trial-type proceedings for formal adjudications;⁶⁶ therefore, IE/ADRC and all other § 21.101(b) exceptions and ELOS remain categorized as informal adjudication actions to which the APA does not apply.

To summarize the categorizations, IE/ADRC have particular applicability (per 5 U.S.C. § 551), are not legislative rulemaking (5 U.S.C. § 553 does not apply), are subject to informal adjudication (per 5

⁶⁶ Cornell Law School. (n.d.). formal adjudication. LII/Legal Information Institute.

U.S.C. § 554, FAA procedures apply), and require public notice and comment (per FAA Reauthorization Act of 2024).

Figure 8 illustrates how IE/ADRC most closely align with advisory circulars (AC), technical standard orders, publications, policy statements, guides, and handbooks. The FAA posts these types of documents for public notice and comment onto an FAA website bulletin board, such as the Aviation Safety Draft Documents Open for Comment (ASDDOC).⁶⁷ In contrast, public notice and comment for SCs, exemptions, airworthiness directives, and regulations are published in the *Federal Register*. The ARC recommends that the ASDDOC website also be used to post IE/ADRC proposals for public notice and comment.

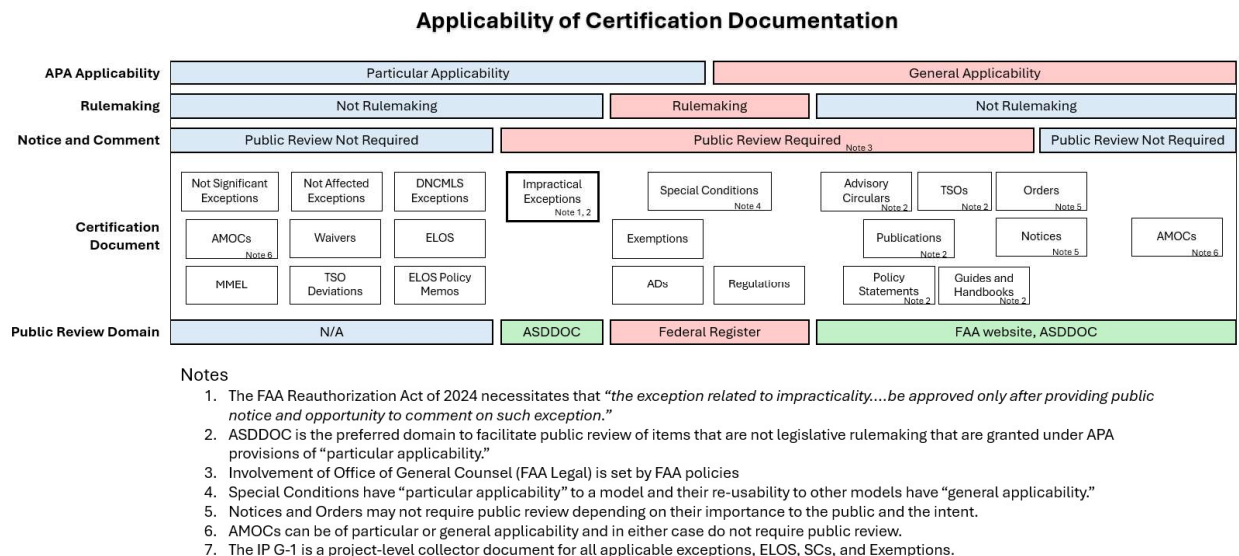


Figure 8: Applicability of Certification Documentation

FAA Order 8110.112A, Standardized Procedures for Usage of Issue Papers (IPs) and Development of Equivalent Levels of Safety Memorandums, establishes IPs as a structured means to describe, track, and resolve type certification issues. In a significant change certification project, IE/ADRC proposals are typically contained in a discrete section of the IP G-1 (e.g., an appendix as one part in the overall certification basis). Development of IE/ADRC and other certification basis proposals follow the maturity arc of the IP G-1 to ensure an adequate certification basis is reached for Stage 4 closure at the project-level. ELOS and SCs are typically developed in unique IPs separate from the G-1. The Figure 9 diagram illustrates how ELOS and SC IPs and IE/ADRC proposals within an IP G-1 are currently initiated by the applicant and processed by the FAA.

⁶⁷ [FAA: Aviation Safety Draft Documents Open for Comment.](#)

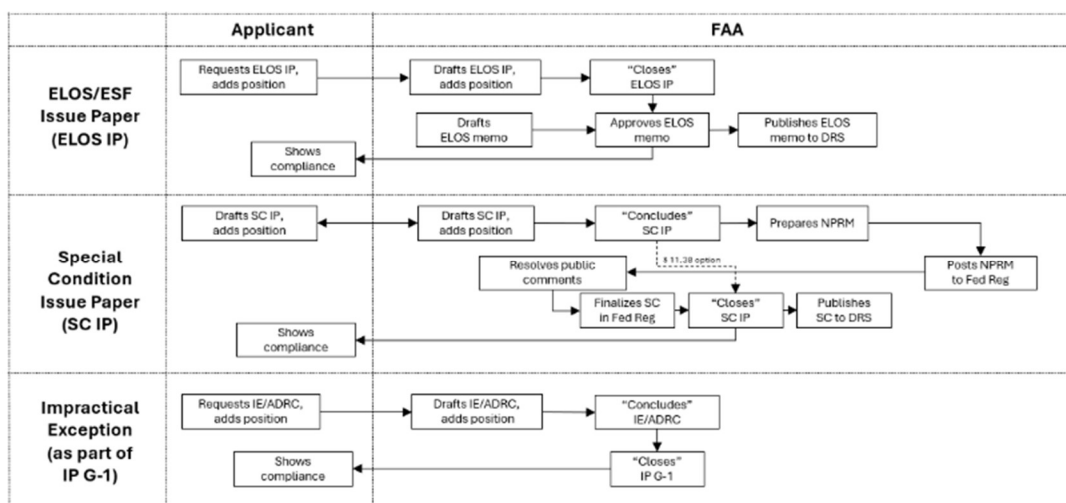


Figure 9: Current Process Flows for ELOS, SC, IE/ADRC

Given the mandate for public notice and comment on IE/ADRC proposals, there is a need to package each IE/ADRC separately from the IP G-1. IE/ADRC proposals may be developed in their own, unique IP, similar to ELOS or SC IPs, or they may remain part of the IP G-1. In either case, the IE/ADRC proposal must be separated into a discrete, consumable document for public release. Only IE/ADRC proposals that both the applicant and the FAA concur with should be available for public notice and comment; other parts of the IP G-1 not associated with the IE/ADRC may remain open for further development and should not be available for public review.

Figure 10 outlines the recommended process flow for IE/ADRC development, as initiated by the applicant and negotiated with the FAA to conclude an IE/ADRC proposal, conduct public notice and comment, and approve the IE/ADRC. The proposed IE/ADRC process adapts the SC process to conduct the public review and adapts the ELOS process to document the outcome.

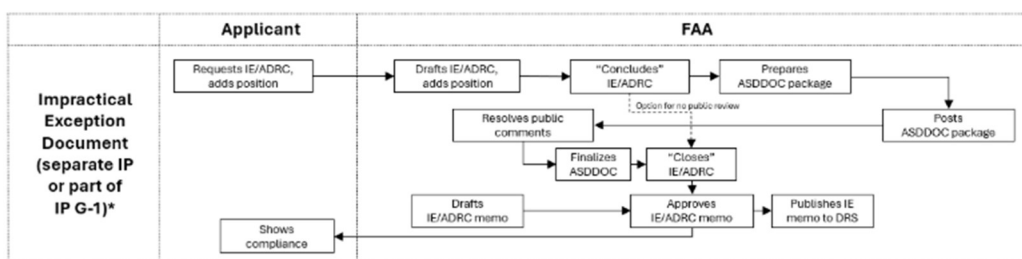


Figure 10: Proposed Process Flow for IE/ADRC

Once the FAA finds an adequate level of safety and concludes the IE/ADRC proposal document (separate from the overall IP G-1 maturity), the IE/ADRC proposal document is prepared for public notice and comment on the ASDDOC website. Similar to SCs, the FAA should consult with the applicant to redact sensitive proprietary information from all documents subject to public review. FAA Order 8110.112A addresses how IPs are redacted to the applicant's satisfaction before they are released to the public; similar protections are needed for IE/ADRC documents. Once the FAA receives and resolves the public comments, the FAA may close the IE/ADRC document on ASDDOC and approve the IE/ADRC memorandum. The concept for IE/ADRC memorandum is similar to the ELOS memorandum, to formally document the FAA's decision on the IE/ADRC proposal and make it

available to the public. Additionally, similar to SC provisions in § 11.38, the ARC recommends that the FAA include provisions to approve IE/ADRC documents without public notice and comment as determined appropriate by the Administrator.

In conclusion, the ARC recommends that the FAA include language in the preamble to the rule notice amending [§ 21.101\(b\)\(3\)](#) to commit the agency to provide public notice and comment prior to approving [each area, system, component, equipment, or appliance in § 21.101\(b\)\(3\) for which the FAA finds compliance to be impractical. The ARC recommends the following language:](#)

* * *

[For each area, system, component, equipment, or appliance in § 21.101\(b\)\(3\) for which the FAA finds compliance to be impractical, the FAA will give notice and invite public comment on the Applicant's proposed Impractical Exception and any associated Additional Design Requirements and Conditions before approving the exception from § 21.101\(a\).](#)

[The FAA may approve the Applicant's exception request without notice and comment in the following circumstances:](#)

1. [The FAA finds the proposed adequate level of safety is sufficiently high that public comment is unlikely to provide additional information; or](#)
2. [The FAA has previously provided an opportunity for public comment on a similar proposal and determines that additional comment is unlikely to provide new information.](#)

This ARC recommendation presents a hybrid framework on the IE/ADRC process based on existing processes for SC development, SC public notice and comment, and ELOS memo documentation. The process for SC development facilitates negotiation between the applicant and the FAA to reach a conclusion on a level of safety for the SC, independent of the overall IP G-1, to then initiate the SC process for public notice and comment. Although the ARC's recommended IE/ADRC process uses ASDDOC for public notice and comment instead of publishing a notice in the *Federal Register*, the IE/ADRC and SC process steps are otherwise similar by ensuring the FAA's deliberation and determination has the benefit of public comments. Thus, the proposed process for IE/ADRC public notice and comment would be aligned with the corresponding SC steps.

Figure 11, below, illustrates the SC and ELOS workflow steps as described in FAA Order 8110.48A and 8110.4C and compares the current vs. proposed IE/ADRC workflows. Viewed together, the ARC expects the proposed IE/ADRC process to be as effective as the SC process to solicit and address public comments, and also to be as effective as the ELOS process to document the outcome for the public record.

D. Certification Basis Documentation

1. FAA Request

Develop a standard format for the certification basis, including reference type design (RTD), as appropriate, and identification of affected areas on a type certificate data sheet that can be applied to all product types. Documentation should consider all product types (i.e., aircraft, aircraft engines, and propellers), drafted Order 8110.123, both type certificates and supplemental type certificates, include identification of the change and affected areas, and ensure appropriate documentation of any exception or exemption from airworthiness requirements.

2. References

The ARC reviewed the following additional FAA orders and guidance, going beyond the FAA request to review drafted Order 8110.123 only:

- FAA draft Order 8110.4D⁷⁰
- FAA Order 8110.48A⁷¹
- FAA Order 8110.56B⁷²
- FAA Part 23 Amendment 23-64 Implementation Procedures Guide⁷³
- FAA Advisory Circular 21.17-4⁷⁴

FAA Order 8110.4C is not addressed within these recommendations, as the FAA has proposed to transfer the type certificate data sheet (TCDS) policy, procedures, and templates in the draft Order 8110.123.

⁷⁰ The FAA posted this document for a prescribed amount of time for the public to review and provide comments.

⁷¹ FAA Order 8100.48A, *How to Establish the Certification Basis for Changed Aeronautical Products* (July 21, 2017).

⁷² FAA Order 8110.56B, *Restricted Category Type Certification* (July 19, 2017).

⁷³ FAA, *Part 23 Amendment 23-64 Implementation Procedures Guide* (June 15, 2022).

⁷⁴ FAA Advisory Circular No. 21.17-4 *Type Certification of Powered-lift* (July 18, 2025).

3. ARC Recommendations

REC A22 - Identify Product Key Characteristics

RECOMMENDATION:

The FAA should provide guidance to identify the product key characteristics involved in the changed product substantial assessment.

INTENT:

To develop a standard FAA type certificate data sheet (TCDS) and supplemental type certificate (STC) format for product key characteristics for parts 23, 25, 27, and 29 categories.

RATIONALE:

Establishing a standardized format for documenting product key characteristics in FAA TCDS and STC is essential to support the substantial change assessment based on the multi-objective criteria proposed in REC1 of the original ARC report.⁷⁵ Standardization ensures that critical design information and limitations are captured in a consistent and traceable manner. It also facilitates the clear identification of the reference type design and the baseline product within the TCDS and STC.

APPROACH:

The scope (regulation/guidance/product category) of this recommendation is as follows:

FAA Regulation change?	FAA Policy change?	FAA Order change?	FAA AC change?	Other
NO	NO	YES	NO	NO

Part-23	Part-25	Part-27	Part-29	Part-33	Part-35	TCDS	STC
X	X	X	X			X	X

Part 33 Products

The ARC retains its position from the original report and does not recommend the development of a dedicated appendix addressing part 33 product key characteristics.

Engines are designed to a precise set of specifications flowing from the airplane manufacturer. Where possible, they are certified to the most extreme envisioned limits for variables, such as thrust and operating limits. Any subsequent changes in design are restricted to the physical limitations of that set of requirements, and while some may be classified as major, none reach the level of substantial.

⁷⁵ Changed Product Rule Aviation Rulemaking Committee, *Final Report*, (December 20, 2024) [p. 14].

Substantial changes in design are sufficiently described in AC 21.101-1B and would most likely result in new model designation(s) and a complete reinvestigation of Part 33.⁷⁶
(Empasis added).

Part 35 products

Following the same principles as part 33 products, the ARC does not recommend the development of a dedicated appendix addressing part 35 product key characteristics.

Part 23, 25, 27, and 29 products

The ARC recommends creating a dedicated document with the sole purpose of identifying and listing the product key characteristics that influence the multi-objective criteria, as described in REC1 of the original ARC report.⁷⁷ This identification should not be interpreted as automatically supporting a substantial change classification evaluation. Establishing a standalone document avoids the need to revise existing TCDS and accommodates the diverse formats and content practices used by various authorities.

This document may be provided in different formats, such as:

- An appendix to the TCDS.
- A section within the Detailed Design Standard (DDS) for part 23 products developed under amendment 23-64.
- A dedicated field within the STC documentation (see the STC discussion below).

Characteristics of the original RTD (the original TC configuration) must be identified, as well as all the subsequent changed product configurations that modify those characteristics:

- Additional reference type design (RTD).
- New baseline product (BP) for major significant change.
- Specific major non-significant change – a change affecting the MTOW modifies the key characteristics already published, but a change implementing an incomplete passenger cabin might not invalidate the key characteristics already published.

Consistent information should be maintained between the RTD and the BP, particularly the criteria relevant to the substantial change evaluation. Only the delta, specifically the parameters that may affect the product's key characteristics, should be identified.

The corresponding RTD/BP pairings referenced in the TCDS should be clearly identified to ensure proper substantial change evaluation throughout the evolution of the product configuration.

The ARC recommends the corresponding RTD/BP pairings should be clearly identified in the TCDS either through a written description or by providing the numerical value. The ARC provides suggested formats in the appendices of this addendum for part 23,⁷⁸ part 25,⁷⁹ and parts 27 and 29.⁸⁰ The ARC also recommends that the FAA amend the draft Order 8110.123 Type Certificate Data Sheet

⁷⁶ Changed Product Rule Aviation Rulemaking Committee, Final Report, (December 20, 2024) [p. 18].

⁷⁷ Changed Product Rule Aviation Rulemaking Committee, *Final Report*, (December 20, 2024) [p. 14].

⁷⁸ See Appendix D of this report.

⁷⁹ See Appendix E of this report.

⁸⁰ See Appendix F of this report.

Procedures⁸¹ and the Part 23 Amendment 23-64 Implementation Procedures Guide,⁸² accordingly, for each product category.

The ARC notes:

- Minor changes have no impact on the product key characteristics.
- For a significant change evaluation, recording the significant_criteria is not required.

Focus on Supplemental Type Certificate

While 14 CFR 21.101 provides guidance regarding the certification basis for STCs, no FAA order currently defines a standard format or required content for an STC Data Sheet (STCDS). As a result, STCDSs are not issued. However, the relevant technical and approval data are available within the STC documentation itself, which is publicly accessible through the FAA Dynamic Regulatory System.

The ARC recommends introducing “product key characteristics” as a dedicated field within the STC documentation. This field should indicate either the specific impacts identified or explicitly confirm when no impact exists. The information should be systematically linked to the corresponding reference type design/baseline product of the type certificate holder. Additionally, any future modifiers should be granted access to these product key characteristics to perform an appropriate substantial change assessment, particularly in cases where the STC is not publicly available (to authorities other than the FAA).

⁸¹ See Appendix G of this report.

⁸² See REC A25.

REC A23 - Standard format for TCDSs and STCs

RECOMMENDATION:

The FAA should develop a standard format for the Certification Basis in both type certificate data sheets (TCDS) and supplemental type certificates (STC).

INTENT:

To ensure clarity, consistency, and traceability in the documentation of the certification basis.

RATIONALE:

A standardized format makes it easier to trace how each regulatory requirement is addressed, including affected/unaffected areas and any amendment-level selections, deviations, equivalent safety findings, or special conditions.

APPROACH:

The scope (regulation/guidance/product category) of this recommendation is as follows:

FAA Regulation change?	FAA Policy change?	FAA Order change?	FAA AC change?	Other
NO	NO	YES	NO	NO

Part-23	Part-25	Part-27	Part-29	Part-33	Part-35	TCDS	STC
X	X	X	X	X	X	X	X

Affected and Unaffected Areas

For modifications affecting most of a product's certification basis, the ARC recommends recording both the affected and unaffected areas directly in the TCDS for clarity and traceability. For example, the certification basis may specify that part 25, as amended through amendment 25-152, applies to the entire product, except § 25.631, which remains at amendment 25-23. For all other cases where only limited portions of the product are modified (in conjunction with an evolution of the certification basis), the ARC recommends recording only the affected areas in the TCDS.

The FAA should maintain flexibility in how affected areas are described, regardless of whether Air Transport Association codes are used. The appropriate level of detail will depend on the scope of the design change to the type certificate. When necessary, affected areas may be documented in a dedicated annex to the TCDS or STC; for example, the use of an Explanatory Note in Annex II of TCDS EASA.A.064 Issue 6 for the A318/A319/A320/A321 product family.

The information provided should remain simple, clear, and sufficient so that third parties can understand the TCDS without needing to interpret or infer additional meaning.

For STCs, the description of affected areas should be presented with greater clarity. A review of existing STCs shows that some provide only high-level descriptions of the design change, making it difficult to determine the precise scope of the affected areas.

Affected areas must also be explicitly and clearly identified when the change impacts a broader scope or crosscutting domains.

The ARC recommends using a format similar to the Issue Paper G-1 (IP G-1) format and recording how to document the certification basis in the TCDS/STC within the IP G-1. A proposal is provided below:

14 CFR		Amendment	Affected Area	Notes
Section	Title			

The ARC suggests the IAWG assess the impact on how to document the certification basis on performance-based regulations (such as unmanned aerial vehicle, electric vertical take-off and landing, and part 23 aircraft post amendment 23-64).

When considering a product where the certification basis is established by performance-based requirements, the ARC proposes the following example for documenting the certification basis in the TCDS/STC:

14 CFR		Amendment	DDS	Affected Area	Notes
Section	Title				

Note: The ARC suggests including the corresponding DDS in the certification basis record table, as it identifies the specific design requirements used to demonstrate compliance with the regulation. This level of detail cannot be achieved when only the performance-based requirement is listed, without specifying which DDS applies to each affected area. Also, the same performance-based requirement may appear multiple times for a given affected area, using different DDS.

Certification Basis

The ARC recommends the FAA revise Draft Order 8110-123 (see Appendix D of this report) as follows:

- Special Condition: Incorporating special condition information into the TCDS should be limited to the special condition identification number and its associated title. The effective date of the special condition is not required to be included.
- Exemption: Including exemption-related information in the TCDS should be limited to the exemption identification number, the applicable amendment level to which the exemption applies, and the exemption title. The date of issuance of the exemption is not required to be recorded in the TCDS. The applicable amendment level for which the exemption has been granted should be explicitly referenced, particularly in cases where the exemption applies to a later amendment level.

- Equivalent Level of Safety (ELOS): The ARC does not propose additional recommendations regarding FAA Draft Order 8110.123, which specifies: *For each ELOS, list the regulations requiring an ELOS, the title of the ELOS memorandum, and the ELOS memorandum number.*⁸³
- Elected compliance with later amendments: Recording the “elect to comply” wording is not required in the TCDS/STC, which already reflects the final state of the certification basis. This is aligned with the FAA Order 8110.48A, which specifies, *Statements such as “elected to comply with ...” should no longer be used in new certification basis entries on TCDSs or STCs.*⁸⁴ The required information to be included in the TCDS/STC consists solely of the applicable requirement and its corresponding amendment level, irrespective of how the applicant originally documented compliance.

The above approaches (Special Condition, Exemption and Equivalent Level of Safety, Elect to Comply) are consistent with EASA WI.CERT.00172-003⁸⁵ and EASA WI.CERT.00146-003.⁸⁶

- Applicable regulations and amendments: Incorporating regulations and amendments into the TCDS should be limited to the applicable regulations and amendments. The effective date is not required to be included.
- Additional Design Requirements and Conditions (ADRCs): The ARC recommends appropriate and transparent recording of the ADRCs (with the appropriate coverage in the guidance material) as described in REC13 from the December 2024 recommendation report.⁸⁷ This is consistent with EASA Working Instruction WI.CERT.00146-003, which states: *In such case the description of the design feature that allows the design feature to be maintained shall be implemented in the TCDS or STC, i.e. the certification basis references the CS paragraph at the earlier amendment associated with these described design features.*⁸⁸ The ARC nevertheless acknowledges the authorities’ concern that the use of ADRCs may result in inconsistent application of exceptions.
- Special Federal Aviation Regulations (SFAR): There is no FAA guidance on how to document the SFAR into the TCDS (as part of the product certification basis). SFAR are referenced (acronym only) within FAA Order 8110.4C. The ARC recommends incorporating the SFAR as part of the certification basis section for TCDS/STC.
- Optional design regulations (or optional regulatory requirements): The ARC recommends indicating in the TCDS/STC whenever optional regulatory requirements are not met to ensure clarity. When these optional requirements are met, no additional recommendation is provided beyond what is already stated in FAA Draft Order 8110.123, which specifies *Include*

⁸³ FAA Draft Order 8110.123, Type Certificate Data Sheet Procedures (June 20, 2022).

⁸⁴ FAA Order 8110.48A, *How to Establish the Certification Basis for Changed Aeronautical Products* (July 21, 2017), [p. 5-5].

⁸⁵ EASA WI.CERT.00172-003, *Certification Process for TCs, RTCs, STCs, Changes, Repairs, and ETSO Authorizations*, (Aug. 25, 2025).

⁸⁶ EASA WI.CERT.00146-003, *CRI and CAI writing and management* (Oct. 28, 2024). Note that exemptions are considered as “deviations” in the EASA System.

⁸⁷ Changed Product Rule Aviation Rulemaking Committee, *Final Report*, (December 20, 2024) [p. 61].

⁸⁸ EASA WI.CERT.00146-003, *CRI and CAI writing and management* (Oct. 28, 2024) [p. 10].

optional regulatory requirements with which the product has complied; for example, ditching, ice protection, and ETOPS.⁸⁹

Certification Basis - Other considerations

The ARC further recommends that the FAA remove the TCDS documentation examples (part 25 only) currently contained in Appendix C of Order 8110.48A (see Appendix E of this report).

In addition, the ARC recommends that the FAA document the STC certification basis using the same format as the TCDS.

The ARC recommends that guidance on how the certification basis be documented in both the TCDS and in the STC be consolidated within a single FAA document (either Order 8110.123 or Order 8110.48A) accompanied by the appropriate cross references, or within another suitable FAA guidance document.

The ARC also recommends the FAA transfer section 13 “Type Certificate Data Sheet” of Order 8110.56B to Order 8110.123.

Furthermore, the ARC recommends the FAA review other orders (for example Order 8110.56B, “Restricted Category Type Certification” or Order 8130.2L, “Airworthiness Certification of Aircraft”) for cross-references that may need to be modified with respect to Order 8110.123 (or any other guidance document), as well as AC 21.17-4 “Type Certification of Powered-lift.”

In addition, the ARC recommends the validation authorities make publicly available the non-proprietary data contained in Special Conditions, Equivalent Level of Safety, etc., that are part of the applicable Certification Basis.

⁸⁹ FAA Draft Order 8110.123, Type Certificate Data Sheet Procedures (June 20, 2022).

REC A24 - Update AC 21.101-1B Chapter 5

RECOMMENDATION:

The FAA should update AC 21.101-1B Chapter 5.⁹⁰

INTENT:

To revise AC 21.101-1B Chapter 5 to align with the ARC's recommendations.

RATIONALE:

Guidance on how to document the certification basis may ultimately be included in FAA Order 8110.123. The ARC considers it essential that AC 21.101-1B Chapter 5 thus includes the appropriate FAA order reference.

APPROACH:

The scope (regulation/guidance/product category) of this recommendation is as follows:

FAA Regulation change?	FAA Policy change?	FAA Order change?	FAA AC change?	Other
NO	NO	NO	YES	NO

Part-23	Part-25	Part-27	Part-29	Part-33	Part-35	TCDS	STC
X	X	X	X	X	X	X	X

The ARC recommends revising AC 21.101-1B Chapter 5, section 5.9.3.1 by referencing the appropriate FAA guidance.

5.9.3 Documenting the Certification Basis.

5.9.3.1 The FAA will amend the certification basis for all design changes that result in a revision to the product's certification basis on the amended TCDS or STC. The FAA will document the resulting certification basis because it is part of the compliance record required by FAA Order 8110.4C. For further information on documenting the certification basis, see FAA Order 8110.48A.

⁹⁰ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. 5-1].

REC A25 - Update the Part 23, Amendment 23-64 Implementation Procedures Guide

RECOMMENDATION:

The FAA should update the Part 23 Amendment 23-64 Implementation Procedures Guide.⁹¹

INTENT:

To revise sections 6.9 “Type Certificate Data Sheet” and 6.11 “Supplemental Type Certificate Form” of the Part 23 Amendment 23-64 Implementation Procedures Guide⁹² to align with the ARC’s recommendations.

RATIONALE:

Guidance on how to document the certification basis may ultimately be included in FAA Order 8110.123. The ARC considers it essential that the Part 23 Amendment 23-64 Implementation Procedures Guide thus includes the appropriate FAA order reference.

APPROACH:

The scope (regulation/guidance/product category) of this recommendation is as follows:

FAA Regulation change?	FAA Policy change?	FAA Order change?	FAA AC change?	Other
NO	NO	NO	NO	YES

Part-23	Part-25	Part-27	Part-29	Part-33	Part-35	TCDS	STC
X						X	X

The ARC recommends revising the Part 23 Amendment 23-64 Implementation Procedures Guide to reference the appropriate updated FAA order, as follows.

6.9 Type Certificate Data Sheet (TCDS).

This section supplements Order 8110.4C CHG 6, Type Certification, March 6, 2017, for projects using amendment 23-64.

For projects using amendment 23-64, specify the § 23.2005 certification and performance level in the certification basis. An acceptable statement is:

“§ 23.2005 Certification Level and Performance Level: Level 2, Low Speed”

List the DDS Summary Document in the certification basis. An acceptable statement is:

⁹¹ FAA Part 23 Amendment 23-64 Implementation Procedures Guide (June 15, 2022).

⁹² FAA Part 23 Amendment 23-64 Implementation Procedures Guide (June 15, 2022) [p. 18].

“The detailed design standards used as a means of compliance in accordance with § 23.2010 are documented in Airplane Manufacturer Report Number 12345 Revision X.”

* * * * *

6.11 Supplemental Type Certificate Form.

This section supplements Order 8110.4C CHG 6, Type Certification, March 6, 2017.

6.11.1 Changes that affect the § 23.2005 certification level, or performance level

For STCs that affect or change the Airplane Performance Level or Airplane Certification Level, note these levels explicitly in the Limitations and Conditions Section. An acceptable example statement is:

Limitations and Conditions

“Incorporation of this STC makes the airplane Level 2, Low Speed for 14 CFR § 23.2005, and the number of passengers cannot be increased without addressing all applicable requirements for a higher level.”

List the DDS Summary Document in the certification basis. An acceptable example statement is:

“The detailed design standards used as a means of compliance in accordance with § 23.2010 are documented in Airplane Manufacturer Report Number 12345 Revision X.”

REC A26 - Consider Performance-Based Regulation Principles in AC 21.101-1B

RECOMMENDATION:

The FAA should revise AC 21.101-1B to consider the performance-based regulation (PBR) principles from part 23, amendment 23-64, which enable the applicant to propose airworthiness means of compliance/detailed design standards (DDS) to address the regulation safety objectives.

INTENT:

To address the lack of dedicated guidance in AC 21.101-1B about the rule application when involving PBR.

RATIONALE:

Part 23, amendment 23-64 replaced prescriptive requirements with performance-based regulations, which enable the applicant to propose airworthiness means of compliance/DDS (Detailed Design Standards) to address the regulation safety objectives.

A key concept introduced by amendment 23-64 is the connection between the new performance-based regulations and the corresponding means of compliance. In contrast, amendment 23-63 is prescriptive, laying out detailed design requirements. Traditionally, compliance has been demonstrated by following established methods that align with these prescriptive rules.

Amendment 23-64 shifts the approach to performance-based standards, which specify the desired safety outcome rather than prescribing how to achieve it. This amendment can be viewed as providing the high-level safety intent. To demonstrate compliance with these performance-based rules, applicants must select an accepted means of compliance as defined by 14 CFR 23.2010. These means of compliance effectively serve the same role as the previous prescriptive requirements in amendment 23-63, providing detailed design standards.

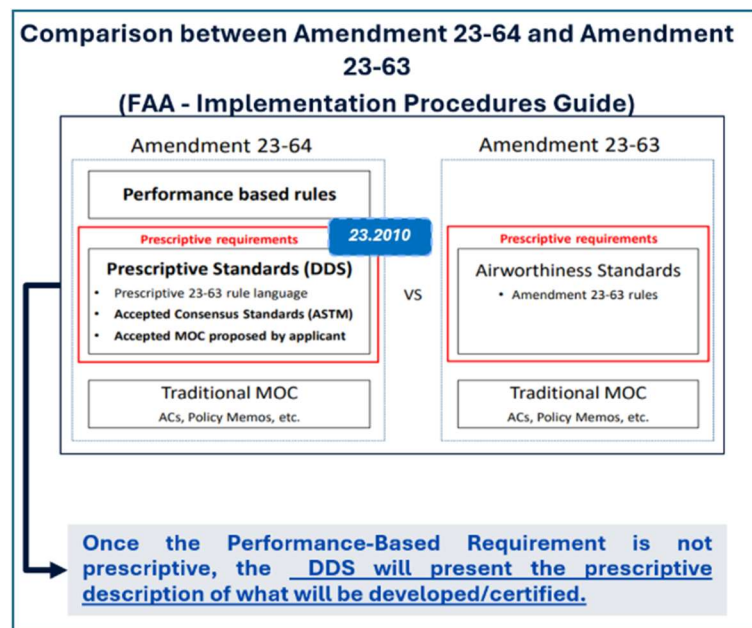


Figure 12: Comparison between Amendment 23-64 and Amendment 23-63

According to AC 23.2010-1⁹³ and the Part 23 Amendment 23-64 Implementation Procedures Guide,⁹⁴ authorities accept and consider the flexibility afforded by a performance-based and means of compliance already reviewed. When considering other possible means of compliance/DDS that can be proposed by the applicant to be accepted by the authority, the list of possibilities can be but is not limited to the below:

- Amendments 23-61 and 23-63.
- ASTM accepted via Notification of Availability.
- ASTM not accepted via Notifications of Availability.
- Small Airplane Issues List DDS.
- Requirements from parts 25, 27, and 29.
- Consensus standards, such as “the Radio Technical Commission for Aeronautics (RTCA), SAE International (SAE), ASTM International (ASTM), and the European Organization for Civil Aviation Equipment (EUROCAE).”⁹⁵
- EASA Special Conditions for VTOL.
- New DDS not covered yet (including prior applicant proposals, as documented in Means of Compliance Issue Paper).

Because requirements from amendment 23-64 are performance based, when performing a CPR analysis for a product whose original certification basis is established by prescriptive requirements, it would be impractical to compare the earlier requirements with the latest requirements.

The Notice of Proposed Rulemaking for the FAA’s Revision of Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Airplanes states that:

*Additionally, the FAA recognizes that it may be impractical for airplanes certified under part 23, amendment 23-62, or prior amendments, to move up to the latest amendment for modifications. Section 21.101 would not be revised to address this circumstance, as this section allows for certification at a lower amendment level if meeting the current amendment is impractical. This current provision would allow for compliance to the certification requirements at amendment 23-62 or earlier when compliance to the latest amendment of part 23 was determined by the FAA to be impractical.*⁹⁶

Given the lack of guidance in AC 21.101 about applying the rule when implementing performance-based requirements, it is important to consider including a brief section in the AC revision providing this guidance.

⁹³ FAA Advisory Circular 23.2010-1, *FAA Accepted Means of Compliance Process for 14 CFR Part 23* (March 27, 2017).

⁹⁴ FAA, *Part 23 Amendment 23-64 Implementation Procedures Guide* (June 15, 2022).

⁹⁵ FAA Advisory Circular No. 23.2010-1, *FAA Accepted Means of Compliance Process for 14 CFR Part 23* (March 27, 2017) [p. 2].

⁹⁶ Revision of Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Airplanes NPRM, 81 FR 13454, 13497 (March 14, 2016).

Part 23 Amendment 23-64 Implementation Procedures Guide - Certification Strategy

The Part 23 Amendment 23-64 Implementation Procedures Guide indicates that during a § 21.101(b)(3) analysis, amendment 23-63 can be used in comparison with earlier requirements to propose which ones in a later amendment would contribute materially to the level of safety:

Section 21.101(b)(3) allows applicants to make exceptions to use previous amendments to the certification basis when the later amendment “would not contribute materially to the level of safety of the product.” This assessment may be challenging when comparing amendment 23-64 with previous amendments because the regulations were reorganized as performance-based regulations. Amendment 23-64 maintained the same level of safety as amendment 23-63 except for loss of control and flight into known icing - so amendment 23-63 can be used for this assessment excluding loss of control and flight into known icing.⁹⁷

The figures below present a schematic of the assessment approach:

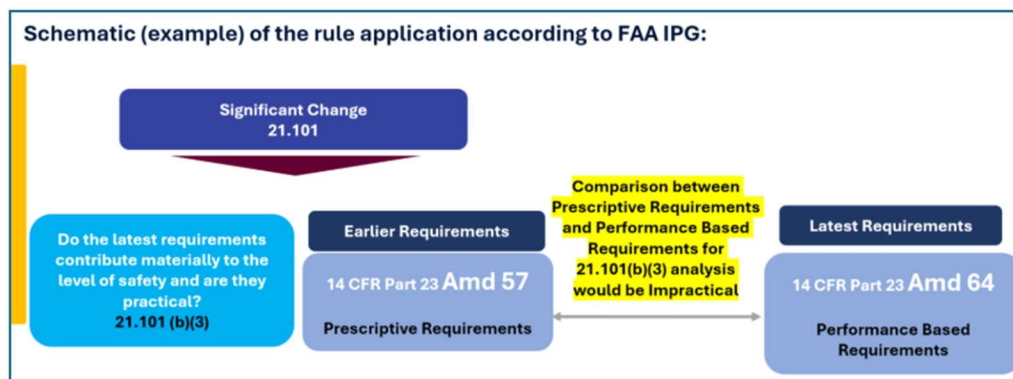


Figure 13: FAA IPG Rule Application, Amendment 23-64 applied as Latest Requirement

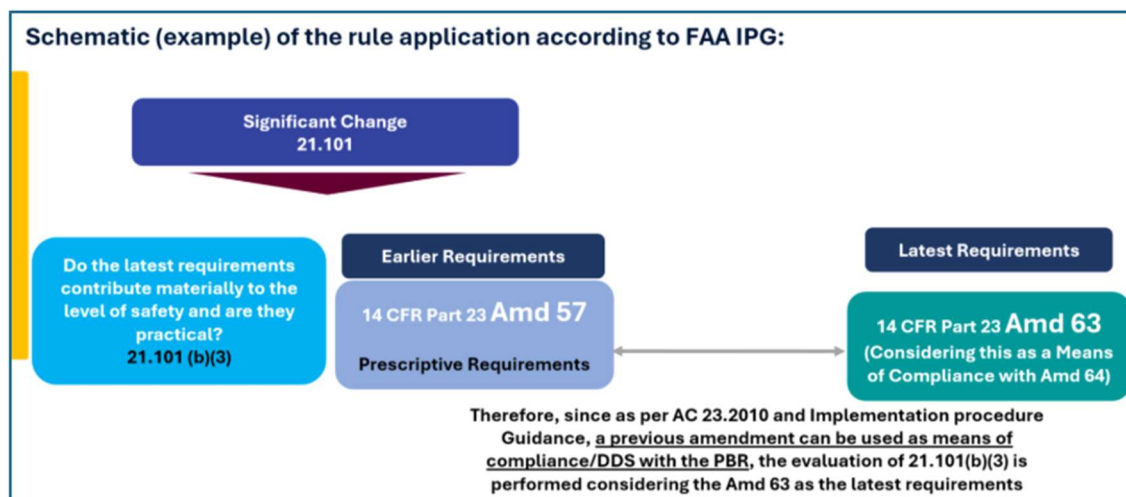


Figure 14: FAA IPG Rule Application, Amendment 23-63 applied as Latest Requirement

The schematic above represents the guidance provided by the FAA when a CPR evaluation under 21.101(b)(3) is performed. Although the evaluation was done based on the amendment 23- 63

⁹⁷ FAA Part 23 Amendment 23-64 Implementation Procedures Guide (June 15, 2022) [p. 17].

requirements, if the conclusion is that the latest requirements would contribute materially to the level of safety and are practical, the associated requirement in amendment 23-64 should be incorporated to the certification basis and the associated means of compliance/DDS shall be agreed with the authority.

APPROACH:

Proposal for AC 21.101-1B review

Because current AC 21.101-1B does not provide information regarding the CPR evaluation under a performance-based environment, the ARC proposes the following approach. Although § 23.2010 allows the applicant to propose different types of DDS, the FAA should consider the following when adopting this approach:

1. For a § 21.101(b)(3) evaluation, it would be impractical to compare a prescriptive regulation (earlier requirement) with the language of a consensus standard that would be used as means of compliance/DDS.
2. Based on the FAA's current guidance for performance-based regulations (the Part 23 Amendment 23-64 Implementation Procedures Guide), the most appropriate approach would be the comparison between a prescriptive regulation (earlier requirement) with amendment 23-63.

The proposed addition to AC 21.101-1B, 3.10 is captured below.

3.10 Step 7. Do the Latest Requirements Contribute Materially to the Level of Safety and are They Practical?

Note: When proposing changes to products with a certification basis prior to amendment 23-64 and applying § 21.101(b)(3) evaluation under a modification that do not affect stall characteristics, loss of control, flight into known icing, or introduce technologies inadequately covered by amendment 23-63 (i.e., requiring SC, ELOS, or exemptions), the evaluation under § 21.101(b)(3) may be performed by comparing the baseline safety intent of amendment 23-64 (expressed through the prescriptive language of amendment 23-63) with the product's current amendment level proposed for modification.

If any modification assessed against amendment 23-63 on the baseline certification product affects stall characteristics, loss of control, flight into known icing or would require special conditions, equivalent level of safety findings or exemptions to be adequately addressed, then, if a § 21.101(b)(3) exception is sought, those areas of change and affected areas must be evaluated for compliance to the later amendment contributing materially to the level of safety.

For the areas where the certification basis step-up to amendment 23-64, the appropriate means of compliance/DDS must be aligned for each amendment 23-64 requirement.

E. AC 21.101-1B Appendix A Examples

ARC Recommendations

REC A27 - Update Appendix A Tables A-1 through A-9.

RECOMMENDATION:

The FAA should revise tables in Appendix A of AC 21.101-1B⁹⁸ for rotorcraft and airplanes.

INTENT:

To revise AC 21.101-1B Appendix A to align with the ARC's Phase 2 recommendations contained in this addendum.

RATIONALE:

The examples of substantial, significant, and not significant changes included in Appendix A of AC 21.101-1B were reviewed during Phase 1 of the ARC (except for part 25 products). REC6 of the Final ARC Report included proposed changes to the examples (except for part 25 products).⁹⁹

As a result of the changes to the definitions for “general configuration” (see REC A5), “principles of construction,” (see REC A6) and “assumptions used for certification” (see REC A7), the ARC reassessed the examples in the part 23, 27, and 29 tables and added a table for part 25 examples.

Following the reassessment from Phase 1 discussions, the ARC further refined the examples in Appendix A using the approach below.

Note that these are only examples. The determination of substantial/significance depends on the actual change application. Future amendments to the airworthiness requirements may affect the validity of some of the examples.

APPROACH:

The FAA should revise the following tables in Appendix A of AC 21.101-1B as listed in Appendix I of this addendum:

- Table A-1. Examples of Substantial Changes for Small Airplanes (part 23).
- Table A-2. Examples of Significant Changes for Small Airplanes (part 23).
- Table A-3. Examples of Not Significant Changes for Small Airplanes (part 23).
- Table A-4. Examples of Substantial Changes for Transport Airplanes (part 25).
- Table A-5. Examples of Significant Changes for Transport Airplanes (part 25).
- Table A-6. Examples of Not Significant Changes for Transport Airplanes (part 25).

⁹⁸ FAA Order/Advisory Circular No. 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products* (March 11, 2016) [p. A-1].

⁹⁹ Changed Product Rule Aviation Rulemaking Committee, *Final Report*, (December 20, 2024) [p. 32].

- Table A-7. Examples of Substantial Changes for Rotorcraft (parts 27 and 29).
- Table A-8. Examples of Significant Changes for Rotorcraft (parts 27 and 29).
- Table A-9. Examples of Not Significant Changes for Rotorcraft (parts 27 and 29).

The FAA should also revise the AC 21.101-1B to add a preamble prior to the above table as follows:

The examples provided in Appendix XX are typical classifications that apply in most cases, though not necessarily all. The classification may change due to cumulative effects and/or combinations of individual changes and/or the emergence of new technology.

Appendices

Appendix A - Acronyms

Acronym	Designation
AC	Advisory Circular
ADRC	Additional Design Requirement and Condition
APA	Administrative Procedure Act
ARC	Aviation Rulemaking Committee
ASDDOC	Aviation Safety Draft Documents Open for Comment
ATC	Amended Type Certificate
BP	Baseline Product
CFR	Code of Federal Regulations
CPR	Changed Product Rule
DDS	Detailed Design Standard
DNCMLS	Does Not Contribute Materially to the Level of Safety
ELOS	Equivalent Level of Safety
FAA	Federal Aviation Administration
IAWG	International Authorities Working Group
IE	Impractical Exceptions
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
IP	Issue Paper
JATR	Joint Authorities Technical Review
MTOW	Maximum Take-Off Weight
REC	Recommendation
RTD	Reference Type Design
SC	Special Conditions
SFAR	Special Federal Aviation Regulations
STC	Supplemental Type Certificates
STCDS	Supplemental Type Certificates Data Sheet
TC	Type Certificate
TCDS	Type Certificate Data Sheet
VFR	Visual Flight Rules

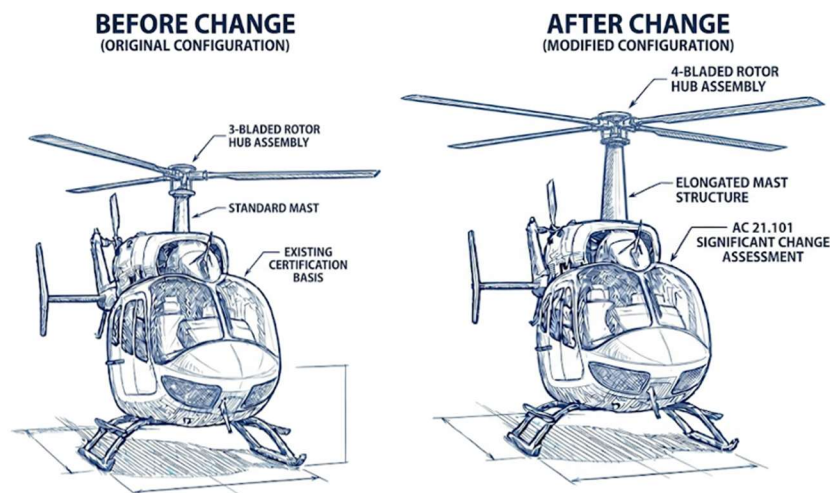
Appendix B - Appendix to AC 21.101-1B: Comprehensive Example-Driven Assessment (Rotorcraft Modification)

To satisfy the explicit IAWG requirement for practical examples that validate the effectiveness of this linear process—particularly in scenarios where historical certification assumptions are invalidated by a major design shift—the FAA should append the following comprehensive engineering case study to AC 21.101-1B.

1. Project Overview and Product Definition

The comprehensive assessment of a design change begins with a rigid definition of the physical and functional deltas between the existing baseline product and the proposed changed product.

- **Baseline Product Definition:** Helicopter Model A. The baseline product is characterized by a rotorcraft system featuring a 3-bladed main rotor assembly. This specific rotor architecture is integral to the aircraft's certified aerodynamic performance, flight characteristics, and structural load profile. The initial type certification was granted under 14 CFR Part 29, Amendments 1 through 51.
- **Changed Product Definition (The Proposed Modification):** Helicopter Model B. The core engineering change involves replacing the existing 3-bladed main rotor system with a newly designed 4-bladed main rotor system featuring an elongated rotor mast with an increase of the maximum weight. This structural modification inherently impacts lift generation, induced drag, high-frequency vibration characteristics, the fatigue life of the rotor system, the swashplate control system, the auto-pilot gains, the rotor speed indicator, and external noise emissions. The change also introduces a new vibration health monitoring system with maintenance credit for rotor parts. The application date for the amended type certificate is set for January 1, 2026.



2. Decomposing the Change: Related and Unrelated Groups

Pursuant to 14 CFR 21.101, the applicant must segregate the proposed modifications into related and unrelated groups to classify their significance independently.

The change is composed of 2 independent groups, each group can exist without the other.

Group Designation	Classification	Justification
Group 1: New 4-bladed rotor assembly and associated physical/functional adaptations and increase of maximum weight.	Significant	This constitutes a product level change resulting in a distinct product configuration. The general configuration is not retained (transitioning from 3 to 4 blades), and the assumptions used for the baseline certification (load distributions, flight domain boundaries, resonance frequencies) are invalidated.
Group 2: First installation of a new Vibration Health Monitoring (VHM) system with maintenance credit.	Not Significant	This is an isolated avionics addition. It does not alter the basic rotorcraft configuration and therefore is not a product level change. As a Not Significant change, it may utilize earlier amendments or the existing baseline certification basis.

3. Initial Affected Areas Identification (Direct & Indirect Scoping)

Using a rigorous top-down systems engineering methodology, the modification is decomposed from the highest Rotorcraft Level down to the System and Equipment levels to identify the initial affected areas, applying the four-category framework.

In this exercise, the areas affected by the change address both related and unrelated groups, keeping in mind that only requirements related to the group of the change classified significant would have to comply with the amendment effective at the date of application.

Level	Affected Items/Characteristics
H/C Level	Aero-mechanical configuration, MTOW increase, and overall performance.
System Level	Main Rotor (Hub, Blades, Mast), Fuselage (cowlings), and the new VHM system.
Equipment Level	AFCS and Instruments display software (SW) adaptations, and new VHM equipment/SW.

3.1 Significant Group Affected Areas

3.1.1 Rotorcraft Level Affected Areas

The transition to a 4-bladed rotor forces a fundamental shift in the aerodynamic physics of the aircraft, notably permitting an increase in Maximum Take-Off Weight (MTOW) and altering the aero-mechanical flight domain.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
Flight Performance	Affected (Cat 2)	Assessing the indirect influence of the MTOW increase on the Height/Velocity (H/V) diagram, and Category A/B performance profiles across the entire certified altitude and temperature envelope.
Flight Characteristics	Affected (Cat 2)	Re-evaluating maneuverability, controllability, and static/dynamic stability (under both VFR and IFR flight rules) due to the altered aero-mechanical configuration.
Dynamics & Vibrations	Affected (Cat 2)	Evaluating shifts in flutter margins, as well as air and ground resonance frequencies caused by the 4-blade harmonic signatures.
Flight Domain and operating limitations	Affected (Cat 2)	Re-definition of critical operating limitations, including Velocity never exceed (Vne), maximum load factor, and weight and CG limits.
	Undetermined (Cat 3)	Verification of the new rotor inertia influence on the rotor speed limits for appropriate maneuvers and associated power variations.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
Crew workload	Undetermined (Cat 3)	Qualitative assessment required to determine whether the new flight characteristics affect the minimum crew requirements in normal and degraded conditions and for all kinds of operations.
Operating Instructions	Affected (Cat 2)	Revised flight manual instructions, including new operating limitations and performance data.
Instructions for Continued Airworthiness	Affected (Cat 2)	Revised maintenance instructions to account for new rotor parts service life limit and inspections.

Iterative Resolution Action:

To resolve the Category 3 “Rotor Speed Limit,” the applicant must conduct inertia and dynamic calculations and/or tests. If the new mass distribution led to a higher range of NR variation in different power conditions, “Rotor Speed Limit” transitions to Category 2 (Affected) and requires a full demonstration of compliance at the new amendment level. If the shift is fully enveloped by existing conservative margins without requiring flight manual alterations, it resolves to Category 4 (Unaffected).

To resolve the Category 3 “Crew workload,” the applicant must conduct qualitative evaluation to confirm the minimum crew requirements for all kinds of operation for which certification is sought. The type of evaluation requested for such confirmation is likely to be the same than for compliance demonstration with the applicable requirements, therefore “crew workload” area would transition to Category 2 (Affected).

3.1.2 Changed Systems Affected Areas

3.1.2.1 Main Rotor Hub, Mast, and Blades (Direct Changes)

The primary structural elements constituting the modification are strictly Category 1 (Directly Affected). The introduction of an elongated mast and a fourth blade necessitate comprehensive, ground-up re-evaluation of structural integrity and damage tolerance limits.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
Structural Design	Affected (Cat 1)	Design assessment and critical parts classification for the entirely new composite blades, elastomeric bearings, hub, and elongated mast.
Flight Loads	Affected (Cat 2)	Investigation of the new flight load magnitudes and dynamic distribution throughout the rotor system. <i>Note: While the loads change (Cat 1), the Flight Spectrum profile itself remains Unaffected (Cat 4) unless the operational mission of the aircraft is altered.</i>
Static & Fatigue Strength	Affected (Cat 1)	Substantiating material suitability, ultimate strength values, static margins, and safe-life calculations for the new dynamic components.
Damage Tolerance	Affected (Cat 1)	Calculating the residual strength of the metallic mast and composite blades following clearly or barely visible damage under the new load conditions. <i>Note: The threat assessment methodology remains Unaffected (Cat 4).</i>
Lightning Protection	Affected (Cat 2)	Reviewing the electrical bonding path through the new hub and calculating the residual structural strength of the new composite blades following a direct Phase 1 lightning strike attachment.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
Bird Strike Protection	Affected (Cat 2)	Verification of the validity of the existing bird strike demonstration for all exposed parts physically affected by the change.

3.1.2.2 Upper flight controls (Direct Changes)

An additional upper flight controls, identical to the existing design, has been incorporated to accommodate the added blade, necessitating comprehensive re-evaluation of structural integrity and damage tolerance limits.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
Upper (boosted) flight controls	Affected (Cat 2)	The upper flight controls for the fourth blade are identical to the other ones. Verification that the critical parts classification remains unchanged under the new fatigue loads and spectrum.
Flight Loads	Affected (Cat 2)	Investigation of the new flight load magnitudes and dynamic distribution throughout the upper flight controls. <i>Note: While the loads change (Cat 2), the overarching Flight Spectrum profile itself remains Unaffected (Cat 4) unless the operational mission of the aircraft is altered.</i>
Static & Fatigue Strength	Affected (Cat 1)	Substantiating static margins, and safe-life calculations for the new dynamic components. <i>Note: material suitability and strength values for added servo-actuator are unchanged and Unaffected (Cat 4).</i>
Damage Tolerance	Affected (Cat 1)	Calculating the residual strength of the upper (boosted) flight controls following clearly or barely visible damage under the new load conditions. <i>Note: The threat assessment methodology remains Unaffected (Cat 4).</i>

3.1.2.3 MGB cowling (Direct Changes)

The MGB cowling shape is adapted for space requirements to accommodate the added upper (boosted) flight controls requiring design and fire protection review.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
Cowling Design	Affected (Cat 1)	Design assessment of the new cowling.
Fire Protection	Affected (Cat 2)	Verification of the fire-proofness of the modified cowling, including residual strength under the new vibration/downwash condition.
Static Strength	Undetermined (Cat 3)	Verification that the adaptation of the MGB cowling has no effect on static strength margins considering sizing load cases (flight).

Iterative Resolution Action:

To resolve the Category 3 "Static Strength," the applicant must conduct design review and FEM. If the new shape of MGB cowling lead to higher loads, "MGB Cowling Static Strength" transitions to Category 2 (Affected) and requires a full demonstration of compliance at the new amendment level. If the changes are marginal and fully enveloped by existing conservative margins without requiring static strength calculations, it resolves to Category 4 (Unaffected).

3.1.3 Unchanged Systems Affected Areas

The CPR methodology requires the systematic identification of physically unchanged legacy hardware that is subjected to new environmental, thermal, or operational threats (Category 2).

Main Gear Box (MGB): The MGB housing and internal transmission gearing remain physically unmodified from the baseline Model A (Cat 4 for design). However, the elongated 4-blade mast alters the dynamic mast bending moment, and the higher MTOW demands increased continuous torque transfer.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
MGB Performance	Undetermined (Cat 3)	The MTOW increase indirectly questions the MGB's endurance capability during the loss-of-lubrication test.
MGB Static and Fatigue Strength	Affected (Cat 2)	The new flight load distribution from the 4-bladed mast must be mapped against the MGB's baseline stress substantiation data to verify if the existing safety margins are eroded. Verification of the influence of the max weight increase on the power spectrum used for transmission parts fatigue strength.

Iterative Resolution Action:

To resolve the Category 3 “MGB Performance,” the applicant must conduct a legacy lubrication test representativeness check. If the previous test conditions are far from the power spectrum and loading condition required by the max weight increase for each phase of the test, “MGB Performance” transitions to Category 2 (Affected) and requires a full demonstration of compliance at the new amendment level. If the changes are marginal and fully enveloped by existing conservative conditions of the previous test, it resolves to Category 4 (Unaffected).

Automatic Flight Control System (AFCS): The legacy flight control computers and serial actuators are physically and functionally unchanged. However, the addition of a fourth blade fundamentally alters the aerodynamic responsiveness of the airframe to actuator inputs.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
Function and Equipment	Affected (Cat 2)	The AFCS software gain settings must be computationally adjusted and flight-tested to prevent over-control, sluggishness, or divergent pitch oscillations. This mandatory adaptation necessitates a new software version, which subsequently triggers a full

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
		Software Development Assurance demonstration against the latest standards.
Development Assurance	Affected (Cat 1)	Specification, Validation, Design, Verification, Configuration Management, and Process Assurance activities according to the required Development Assurance Level for AFCS.

Airframe and skid landing gear: The airframe and skid landing gear are physically and functionally unchanged. However, the max weight increase could invalidate strength demonstration assumptions.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
Airframe Design	Unaffected (Cat 4)	The design aspects (materials and processes, parts design, inspection provisions, etc.) of the airframe and skid landing gear are unchanged.
Airframe Static Strength	Undetermined (Cat 3)	Verification of the influence of the max weight increase of the design value used for the determination of the ground loading conditions and assumptions. Local structure around the pylon attachment may also be affected depending on the new loads distribution from the 4 bladed rotor through the transmission.

Ground Resonance	Undetermined (Cat 3)	Verification of the influence of max weight increase on the ground resonance margins in the most critical configuration over the whole weight and temperature domain.
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Iterative Resolution Action:

To resolve the Category 3 “Airframe static strength,” the applicant must conduct a load survey. If the max weight increase led to consideration of higher design value for the determination of the ground loading condition, “Airframe static strength” transitions to Category 2 (Affected) and requires a full demonstration of compliance at the new amendment level. If the shift is fully enveloped by existing conservative margins without requiring further strength demonstration, it resolves to Category 4 (Unaffected). The load survey should also check to what extent the new loads distribution from the 4-bladed rotor through the transmission could also affect the pylon attachment and the upper structure.

To resolve the Category 3 “Ground resonance,” the applicant must conduct dynamic oscillation computation. If the max weight increase led to consideration of lower ground resonance margin in the most critical configuration (weight, temperature) then the “Ground resonance” transitions to Category 2 (Affected) and requires a full demonstration of compliance at the new amendment level. If the shift is fully enveloped by existing conservative margins without requiring further ground resonance demonstration, it resolves to Category 4 (Unaffected).

3.2 Not Significant Group Affected Areas

3.2.1 Vibration Health Monitoring (Direct Changes)

Although it is not part of the significant change, the effects of the installation of a VHM System on the product characteristics and the determination of the associated affected area is necessary. It includes new functional installation, vibration monitoring of rotor parts (sensors, computers) with maintenance credit, and flight crew interface and alerting

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
VHM System Function and Performance *	Affected (Cat 1)	Evaluation of VHM design for maintenance credit, demonstration of monitoring function performance and service introduction criteria.

Area of Demonstration	Categorization	Specific Engineering Characteristics Assessed
System Safety	Affected (Cat 1)	Definition of functional failure conditions, possible particular risks and assessment of associated safety objectives due to the maintenance credit objective.
Development Assurance	Affected (Cat 1)	Specification, Validation, Design, Verification, Configuration Management, and Process Assurance activities according to the required Development Assurance Level for VHM System, Electronic Hardware and Software.
Human Factors	Affected (Cat 1)	Definition of intended function, crew interface, procedures, alerting, and assessment of possible crew errors considering integration, complexity, and novelty.
Cybersecurity *	Affected (Cat 1)	Identification of possible electronic interaction, definition of assets and attack path, assessment of safety impact and determination of security protection means.
Electrical integration	Affected (Cat 1)	Identification of electrical components affected by the new installation, essential loads identification, ELA, and review of electromagnetic hazards.

(*) These areas of demonstration are not included in the baseline product certification basis but triggered by the novelty of the VHM installation with maintenance credit requiring a Special Condition.

4 Allocation of Requirements and Scope Broadening

Following the delineation of the initial affected areas (Categories 1 and 2), the applicant must allocate the applicable part 29 requirements at the amendment level effective on January 1, 2026.

This phase introduces the crucial “Adjustment of Affected Areas,” where the boundaries are pushed outward based on the Technical Consistency Criteria of broad-scope regulations.

4.1 Combined list of initial affected areas and applicable requirements

Combining the list of affected areas of demonstration (Categories 1 and 2) with the applicable requirements consists of allocating the 14 CFR Part 29 requirements (at the amendment effective at the date of application) to the specific characteristics being assessed for each area.

When performing this allocation, attention shall be paid to requirements for which the scope of applicability is broader than the scope of the areas of demonstration for the specific characteristics being assessed.

Note: there is no need to allocate requirements to unaffected areas (Category 4) as compliance demonstration remains valid for these areas.

Areas of demonstration	Specific characteristics being assessed	Applicable Requirement	Broad scope
Flight Performance	H/V diagram, Cat A and Cat B performance	§§ 45 to 87	N
Flight Characteristics	Maneuverability, Controllability, Stability	§§ 141 to 181	N
Dynamic & Vibrations	Flutter, air and ground resonance	§§ 241, 251, 629	N
Flight Domain	Vne, max load factor, rotor speed, weight, and balance	§§ 1501 to 1525	N
Operating Instructions	RFM Sections pertaining to limitations and performance	§§ 1581 to 1587	N

Areas of demonstration	Specific characteristics being assessed	Applicable Requirement	Broad scope
Design aspects	Rotor Hub, Mast, Blades, and Upper Controls Design	§§ 547, 601 to 611	N
	Hydraulic system proof pressure	§ 1435	N
	Equipment qualification (servo)	§ 695	N
Fire Protection	New cowling fireproofness	§§ 861, 1193	N
Flight loads	Investigation of flight loads in the overall domain	§§ 337, 571	Y
Static strength	Substantiation of the Rotor and Fuselage parts due to changed loads	§§ 301 to 307	N
Fatigue and Damage Tolerance	Flight loads, Threat assessment, Safe life, Damage tolerance for new Rotor Hub, Blades and mast	§§ 571, 573	Y
Lightning Direct Effects	Protection of Rotor and Blades against lightning strike	§ 610	Y
Bird Strike	Protection of blades against bird impact	§ 631	Y
Function & Equipment	AFCS function, instruments (NR, limit)	§§ 672, 1301, 1305, 1329	N
	VHM equipment qualification, syst performance, thermal and vibration environment	§§ 1301, 1309	Y
Electrical Integration	New harness (VHM), updated ELA, EM hazards immunity (EMI/EMC, LIE)	§§ 1316, 1351, 1353	Y

Areas of demonstration	Specific characteristics being assessed	Applicable Requirement	Broad scope
Human Factors	Human error, alerting (new limit indicator)	§§ 1302, 1322	Y
	Pilot Workload, Min Crew, Kinds of Operation	§§ 1523, 1525	Y
Safety	New Failure Conditions related to VHM system	§ 1309	Y
Cybersecurity	PISRA for VHM (asset, attack path, mitigation)	Special Condition	Y
Development and SW Assurance	VHM system and SW development assurance	§ 1309	Y
ICA	New ALS (Rotor, Blade, Servo) and other ICA	§ 1529	Y

4.2 Affected Areas Expansion based on Technical Consistency

The following table demonstrates the precise mechanics of how broad-scope requirements force the expansion of the affected area beyond the immediate physical and functional modifications.

Applicable Part 29 Regulation	Initial Area of Demonstration	Technical Consistency Criterion Applied	Final Expanded Scope of the Affected Area
§ 29.571, § 29.573 (Fatigue and Damage Tolerance)	New Rotor Hub, Mast, and 4 Composite Blades	Load Path & Distribution	The initial physical area was limited to the rotor assembly. However, § 29.571 applies to all Principal Structural Elements (PSEs). Because the 4-bladed system alters the magnitude and frequency of vibratory loads transmitted

Applicable Part 29 Regulation	Initial Area of Demonstration	Technical Consistency Criterion Applied	Final Expanded Scope of the Affected Area
			downward, the affected area expands to include all legacy PSEs in the fuselage that experience the new load distribution .
§ 29.610 (Lightning Direct Effects)	New Rotor Hub and Blades	Electrical Bonding Path	The area expands from the blade tips along the entire continuous bonding path, incorporating the legacy slip rings, control rods, and fuselage ground straps to ensure the new components do not create high-resistance bottlenecks leading to catastrophic arcing.
§ 29.631 (Bird Strike)	New Composite Blades	Hazard Scenario Sequence	The area expands to include all legacy components (e.g., pitch links, swashplate) involved in the sequential bird strike hazard scenario, evaluating the indirect effects of blade damage following an impact.
§ 29.1309 (Equipment, Systems, and Installations)	Installed VHM System (Hardware & Software)	Failure Conditions & Zonal Consistency	The VHM system introduces new failure conditions. The area expands to include all interconnected legacy contributors to that failure condition (e.g., legacy electrical generators, displays). Zonal consistency demands assessing legacy equipment sharing the VHM's physical bay to ensure no new thermal or EMI hazards are introduced.

Applicable Part 29 Regulation	Initial Area of Demonstration	Technical Consistency Criterion Applied	Final Expanded Scope of the Affected Area
§ 29.13092, § 29.1322 (Alerting)	New VHM Cockpit Indicator	Cockpit Integration & Workload	The requirement applies to all “installed systems used by the crew.” The area expands to assess the entire flight deck integration philosophy. The VHM alert must not contradict legacy alerting logic or increase overall pilot workload during emergency procedures.
Special Condition (Cybersecurity)	VHM Wireless Communication	Attack Path Mitigation	The VHM introduces a new external data node. The affected area expands along the entire internal digital network to assess all legacy systems connected to the VHM, verifying robust isolation against lateral cyber-attack propagation.

5 Finalizing the Certification Basis

By strictly adhering to this linear methodology—first scoping the physical/functional direct and indirect effects via the four-category framework, resolving Category 3 ambiguities, and finally expanding the boundaries via technical consistency criteria—the applicant arrives at a sound final list of affected areas with allocated requirements and amendment level.

This final list dictates the precise architecture of the Certification Plan. Completely unaffected legacy areas (Category 4) will retain the historical baseline certification basis (Amendments 1-51), while the clearly defined and expanded affected areas will be substantiated against the latest regulatory amendments in effect on the date of application unless DNCMLS or impractical exceptions are granted allowing earlier amendments to be used. This guarantees that the cumulative effects of the 4-blade modification are evaluated comprehensively, ensuring a consistent upgrade of the safety standard of the new product and the linearity of the Changed Product Rule process.

Appl. Req	Amdt level	Areas of demonstration	Specific characteristics being assessed	Scope: Rotorcraft/ System level
§§ 45 to 87	latest	Flight Performance	H/V diagram, Cat A and Cat B performance	Rotorcraft
§§ 141 to 181	latest	Handling Qualities	Maneuverability, Controllability, Stability	Rotorcraft
§§ 241, 251, 629	latest	Dynamic & vibrations	Flutter, air and ground resonance	Rotorcraft
§§ 1501 to 1525	latest	Flight Domain	Vne, max load factor, rotor speed, weight and balance	Rotorcraft
§§ 1581 to 1587	latest	Operating Instructions	RFM Section 2 and 5	Rotorcraft
§§ 547, 601 to 611 § 1435 § 695	latest	Design aspects	Rotor Hub, Mast, Blades and Upper Controls Design Hydraulic system proof pressure Equipment qualification (servo)	Main Rotor Hub, Blades, Main Rotor Mast Servo-actuator

Appl. Req	Amdt level	Areas of demonstration	Specific characteristics being assessed	Scope: Rotorcraft/ System level
§§ 861, 1193	latest	Fire Protection	New cowling fireproofness	MGB cowling
§§ 337, 571	latest	Flight loads	Investigation of flight loads in the overall domain	Main Rotor Hub, Blade, Main Rotor Mast, Upper flight controls
§§ 301 to 307	latest	Static strength	Substantiation of the Rotor and Fuselage parts due to increased loads	Main Rotor Hub, Blades, Main Rotor Mast, Upper flight controls, MGB cowling
§§ 571, 573	latest	Fatigue and Damage Tolerance	Flight loads, Threat assessment, Safe life, Damage tolerance	Main Rotor Hub, Blades, Main Rotor Mast, Upper flight controls / servo-actuator + other PSE iaw new load distribution
§ 610	latest	Lightning Direct Effects	Protection of Rotor and Blades against lightning strike	Main Rotor Blades and Hub + Other parts on the lightning path
§ 631	latest	Bird strike	Protection of blades against bird impact	Main Rotor Blades and Pitch rods + Other parts on the Bird impact scenario

Appl. Req	Amdt level	Areas of demonstration	Specific characteristics being assessed	Scope: Rotorcraft/ System level
§§ 1301, 1305, 1329 §§ 1301, 1309, 1465	Latest earlier	Function & Equipment	AFCS function, instruments (NR, limit) VHM equipment qualification, syst performance, thermal and vibration environment	AFCS SW VHM System
§§ 1316, 1351, 1353	earlier	Electrical integration	New EWIS components (VHM), updated ELA, EM hazards immunity (EMI/EMC, LIE)	VHM EWIS
§§ 1309, 1322 §§ 1523, 1525	Earlier latest	Alerting	Human error, alerting (new limit indicator) Pilot Workload, KoO	VHM indicator Rotorcraft
§§ 1309, 1465	earlier	Safety	New Failure Conditions related to VHM system	VHM system + all other contributors to the new FC
Special Condition	earlier	Cybersecurity	PISRA for VHM (asset, attack path, mitigation)	VHM system + all other assets on the attack path
§§ 1309	earlier	Development and SW Assurance	VHM system and SW development assurance	VHM system
§§ 1529	latest	ICA	New ALS (Rotor, Blade, Servo) and other ICA	Rotorcraft

Note: The installation of the VHM system being not significant, the requirements applicable to the areas affected by this installation could remain at the Amendment effective for the baseline product.

Appendix C - Exceptions

Proposed AC 21.101 -1B Updates

Selected sections requiring updates. Edits in blue text, additions underlined, deletions ~~struck through~~.

* * * * *

Chapter 3. Process for Establishing the Certification Basis for Changed Products

3.10 Step 7. Do the Latest Requirements Contribute Materially to the Level of Safety and are They Practical?

Pursuant to § 21.101(a), compliance with the latest airworthiness standards is required. However, exceptions may be allowed pursuant to § 21.101(b)(3). The applicant must provide justification to support the rationale for the application of earlier amendments for areas affected by a significant change to document that compliance with the later latest requirements in these areas would not contribute materially to the level of safety or would be impractical. Such justification should address all the aspects of the area, system, component, equipment, or appliance affected by the significant change. See paragraphs 3.10.1 and 3.10.1.4 of this AC.

3.10.1 Do the Latest Requirements Contribute Materially to the Level of Safety?

You could consider compliance with the latest requirements to “not contribute materially to the level of safety” if the existing type design and/or relevant experience demonstrates a level of safety comparable to that provided by the latest requirements. Generally, the latest requirements are developed to achieve a higher or more comprehensive level of safety compared to earlier or existing requirements, as illustrated in Figure X.

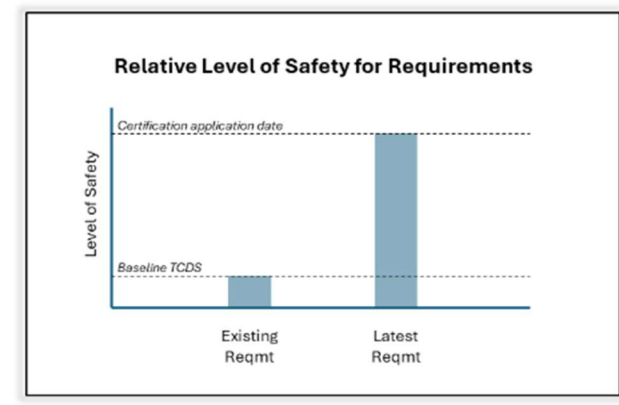


Figure X: Relative Level of Safety for Existing and Latest Requirements.

However, the latest requirements are often promulgated to address specific hazards or safety concerns that may have limited applicability or effectiveness to a changed product. The safety benefits of addressing such hazards are described in the Notice of Proposed Rule Making (NPRM) and final rule preambles associated with each requirement.

If an applicant pursues a § 21.101(b)(3) proposal, it should perform a thorough assessment of the safety benefits based on the source documentation as it applies to the affected areas of the product. The assessment should consider whether the existing or changed type design adequately addresses the identified hazards and supports a level of safety that is comparable to that intended by the latest requirements.

In comparing the relative levels of safety for a § 21.101(b)(3) exception, ~~in cases where~~ design features on the baseline or improved design features on the changed product may provide a level of safety greater than the existing certification basis, ~~you~~ The applicant may use acceptable data, such as service experience, to establish the effectiveness of those design features at mitigating the specific hazards ~~promulgated in the by a later~~ latest amendment. ~~You~~ The applicant must provide sufficient justification to allow the FAA to ~~make this determination~~ determine if the changed product will have an adequate level of safety relative to that intended by the latest requirements. An acceptable ~~means of compliance method to propose a § 21.101(b)(3) exception~~ is described in Appendix E of this AC. Justification is sufficient when it provides a summary of the evaluation that supports the determination using an agreed evaluation method such as that in Appendix E of this AC. ~~This exception could be applicable in the~~ The situations described in the paragraphs below may support the § 21.101(b)(3) exception. Within an affected area, and based on the applicant's rationale and evidence, the FAA may find that compliance with the latest requirements does not contribute materially to the level of safety for the overall product, and that compliance may be shown to earlier amendment levels up to the existing requirements listed on the baseline product's TCDS. If the FAA determines that compliance to the latest requirements does contribute materially to the level of safety for the overall product, then an exception to the existing requirement cannot be granted as proposed.

Note: Compliance with later requirements is not required where the amendment is of an administrative nature and made only to correct inconsequential errors or omissions, consolidate text, or clarify an existing requirement.

3.10.1.1 **Improved Design Features Additional Design Requirements and Conditions.**

Design features that provide a level of safety that exceed the existing certification basis requirements, but do not meet the latest requirements, can be used as a basis for granting an exception under § 21.101(b)(3) ~~since complying with the latest amendment of the requirements would not contribute materially to the level of safety of the product. The applicant may propose Additional Design Requirements and Conditions (ADRCs) that raise the changed product's level of safety and close the gap to the latest requirements such that the latest requirements do not contribute materially to the level of safety and enable the FAA to grant a § 21.101(b)(3) exception with the ADRC. This concept of ADRC adjudication to determine an adequate level of safety between the existing and latest requirements is illustrated in Figure Y.~~

~~If the FAA accepts these design features accepted by the FAA, as justification for an exception, you must the design features must be documented and incorporated them into the certification basis and record them, where necessary, as ADRCs. The description of the design feature would be provided~~

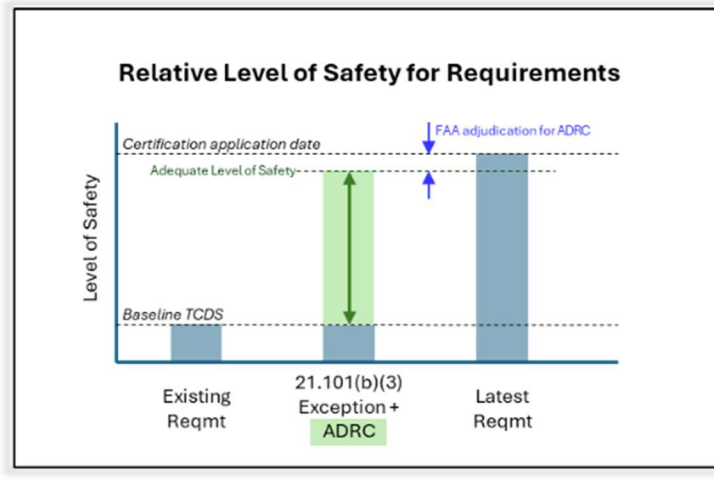


Figure Y: Relative Level of Safety for ADRCs

ADRCs are recorded in the TCDS or STC at a level ~~that allows the design feature to be maintained that ensures their continued maintenance and oversight~~ but do not contain proprietary information. It is recommended that ADRCs are listed in the certification basis by the nomenclature “ADRC-xx.xxxx [amdt level].”

For example, an applicant proposes to install winglets on a part 25 airplane, and part of the design involves adding a small number of new wing fuel tank fasteners. Assuming that the latest applicable amendment of § 25.981 is Amendment 25-102, which requires structural lightning protection, the applicant could propose an exception from these latest structural lightning protection requirements because the design change uses new wing fuel tank fasteners with cap seals installed. The cap seal is a design feature that exceeds the requirement of § 25.981 at a previous Amendment 25-11, but does not meet the latest Amendment 25-102. If the applicant can successfully substantiate that compliance with Amendment 25-102 would not materially increase the level of safety of the changed product, then this design feature can be accepted as an exception to compliance with the latest amendment with compliance to ADRC-25.981[25-11].

* * *

3.10.2.2

In cases where the FAA grants a § 21.101(b)(3) exception from complying with the latest requirements, the changed product may have a design that nearly complies with the latest amendments. Here the applicant may show that full compliance would require a substantial increase in the outlay or expenditure of resources with a small increase in the level of safety. These design features can be used as a basis for granting an exception under § 21.101(b)(3) on the basis of “impracticability” and should be documented as ADRCs in the certification basis.

Appendix B. Application Charts for Changed Product Rule

Table B-1. Application Chart for § 21.101(a) and (b) and § 21.19

Substantial (§ 21.19)	Significant (§ 21.101(a) and (b))			Not Significant (§ 21.101(b)(1))	
Substantially changed product Compliance to all latest regulatory standards required for product certification. Previously approved type design and compliance data may be allowed if valid for the changed product.	Affected area (Changed and/or affected areas) New showing of compliance is required		Unaffected area No new showing of compliance is required. Unaffected area continues to comply with the existing certification basis.	Affected area (Changed and/or affected areas) New showing of compliance is required. The applicant may propose a certification basis using an earlier amendment but not earlier than the existing TC basis.	Unaffected area No new showing of compliance is required. Unaffected area continues to comply with the existing certification basis.
	Compliance with the latest amendment materially contributes to safety		No material contribution to safety The applicant may propose a certification basis using earlier regulatory requirements(s), but not earlier than the existing TC basis.		
	Practical	Impractical The applicant may propose a certification basis using earlier regulatory requirements(s), but not earlier than the existing TC basis.			
Certification Basis Proposed by Applicant					
New certification basis using latest regulatory standards.	Latest regulatory standards, with earlier amendments with supporting rationale.		Existing certification basis.	Existing certification basis including elect to comply.	Existing certification basis.
FAA Resultant Type Certification Basis					
New certification basis using the latest regulatory standards, and special conditions if required.	New certification basis using the latest regulatory standards with earlier approved amendments and special conditions if required.		Existing certification basis.	Existing certification basis (if adequate); if not, first appropriate later amendment(s) and/or special condition including elect to comply.	Existing certification basis.

Appendix E. Application Charts for Changed Product Rule

E.2.5.1 When each amendment is issued, it is usually expected that compliance with the requirement would be completely effective at addressing the associated hazard for the designs and technology envisioned at the time. It is expected the hazard would be eliminated, avoided, or mitigated. However, experience has shown that this may not always be the case. It is also possible that earlier amendment levels may have addressed the hazard but were not completely effective. A The existing baseline product may also contain a design feature(s) that provides a level of safety that approaches the latest regulations yet is not fully compliant with the latest regulations. Proposed ADRCs that document design features or other conditions may provide a level of safety of the product higher than that of the baseline product certification basis when compliance with the latest requirements does not contribute to the level of safety. Therefore, in comparing the benefits of compliance with the existing certification basis to the latest amendment level, it is useful to estimate the effectiveness of both amendment levels in dealing with the hazard.

E.2.7 Step 7: Document the Conclusion.

With the information from previous steps documented and reviewed, the applicant's position and rationale regarding whether complying with the latest regulations contributes materially

to the product's level of safety or its practicality can be documented. The FAA records their position to the proposed exception including any applicable ADRCs. That determination is based on the information and analysis provided by the applicant in the preceding steps. If the determination to grant the exception is based on the product's design features ADRCs, those features the ADRCs are must be documented at a high level in the certification basis in the TCDS. Documentation in the TCDS/STC is required so that the features are maintained during subsequent changes to the product, therefore, maintaining the product's agreed level of safety. If the results of this analysis are inconclusive, then further discussions with the FAA are warranted.

* * * * *

Appendix G. Changed Product Rule Decision Record

Step 7: Do the latest requirements contribute materially to the level of safety and are they practical? (See paragraph 3.10 of AC 21.101-1B) ☐ Continuation Sheet(s) Attached	☐ Yes Latest Requirements: Propose a certification basis using the standards in effect on the date of application. ☐ No Earlier Requirements: You may propose a certification basis using the standards in effect before the date of application but not earlier than the existing certification basis. Certification basis defined or documented as indicated below. Note: Several standards may apply to each affected area, and the assessment may differ from standard to standard. Indicate "Yes" if compliance with any latest standard(s) is required. Indicate "No" only if earlier standards are proposed.
Note:	You may submit a proposal for the decision in Step 7; however, the FAA will make the final certification basis determination.

Add
", including
ADRC(s),"

* * * * *

Appendix H. Examples of Documenting the Proposed Certification Basis List

H.1 Example 1

H.1.2.4 If you propose a certification basis that includes amendment levels earlier than what was in effect at the date of application, such as ADRCs, include the exception and ADRC proposal as outlined in § 21.101 and your justification if needed.

H.1.3.3 Compliance to the regulation would not contribute materially to the level of safety (§ 21.101(b)(3)). Propose ADRC(s) as needed for an adequate level of safety.

H.1.3.4 Compliance to the regulation would be impractical (§ 21.101(b)(3)). Propose ADRC(s) as needed for an adequate level of safety.

H.2 Example 2

1.2 Acronyms

Acronym	Meaning
ADRC	Additional Design Requirement and Condition

3.1.2 Section 21.101 Exception Rationale.

The completed rationale for each does not contribute materially to the level of safety (DNCMLS) or impractical exception is provided in this section. [Include ADRCs as needed for an adequate level of safety.](#)

Exception 1:

ADRC No. (or TBD)	Title	Applicable Regulation
*note		

[*note: Use nomenclature ADRC-23.xxxx / 25.xxxx / 27.xxxx / 29.xxxx / 33.xxxx / 35.xxxx \[amdt level\]](#)

Exception 2:

* * * * *

Appendix J. Definitions and Terminology

J.6 Earlier Requirements.

The requirements in effect prior to the date of application for the change, but not prior to the existing certification basis. [Earlier requirements are inclusive of existing requirements and are not equal to the latest requirements.](#)

J.7 Existing Certification Basis [\(or Existing Requirements\)](#).

The requirements incorporated by reference in the type certificate or supplemental type certificate of the baseline product to be changed.

* * *

J.16 [Additional Design Requirements and Conditions.](#)

[A requirements provision that ensures an adequate level of safety for the FAA to grant an exception under § 21.101\(b\)\(3\). ADRCs must be recorded in the certification basis.](#) * * *

~~H.3.1.8 Additional Design Requirements and Conditions~~

Appendix D - Certification Basis Documentation

ANNEX 1: PART-23 Product Key Characteristics Documentation example

[INTRODUCTION]

- RTD1 = Original TC Configuration and RTD1 Configuration = BP1 Configuration
- BP11 = BP1 fitted with major significant design change A with no alteration/no modification of the RTD1; leading to a new baseline product identifier
- RTD2 = Additional RTD and RTD2 Configuration = BP2 Configuration
- BP2 fitted with change C = BP2 fitted with major not significant design change C

[TABLE / TEXT TO BE INCORPORATED]

RTD Ref. n°	RTD Configuration Identifier	BP Ref. n°	BP Configuration Identifier	Criteria 1	Criteria 2							Criteria 3	Criteria 4	Criteria 5	
					fuselage width*	fuselage length*	wing area*	horizontal tail plane area*	vertical tail plane area*	wing sweep*	airframe-level			Maximum Take-off Thrust *	Maximum Take-off Weight *
RTD1	[id RTD1]	BP1	[id BP1]	see Notes							see Notes	see Notes	see Notes		
RTD1	[id RTD1]	BP11	[id BP11]	see Notes							see Notes	see Notes	see Notes		
RTD2	[id RTD2]	BP2	[id BP2]	see Notes							see Notes	see Notes	see Notes		
RTD2	[id RTD2]	BP2	[id BP2] fitted with change C	see Notes							see Notes	see Notes	see Notes		

*Numerical value

Notes:

Criteria 1 – Description of main physical configuration and overall construction

[Descriptive Section]

Preamble: Criteria 1 addresses Changes to an aircraft's main physical configuration (e.g., low to high wing or empennage), addition of aero lifting new surfaces (e.g., canards), different fuselage cross section (e.g., double deck vs single deck), different wing planform (e.g., blended wing), number and location of engines, or overall construction (e.g., going from a metallic to a full composite airframe).

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 2 – Airframe and Structural Configuration

[Descriptive Section]

Preamble: Airframe-level change addresses, for example, fuselage integrated wing carry-thru structure vs. wing carry-thru external to fuselage, airframe structure provisions for a change in engine number and position.

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 3 – Aircraft Systems

[Descriptive Section]

Preamble: Criteria 3 addresses changes across aircraft systems that execute critical product level functions extensively impacting either:

- *the overall product’s architecture (driving extensive architectural changes) and integration across multiple systems, or*
- *critical aspects of the flight crew human-machine interface at a product level*

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 4 – Principles of propulsion or operations

[Descriptive Section]

Preamble: Criteria 4 addresses change in engine using different principles of propulsion or operation (e.g., replacing a turbo-propeller with a turbofan, or changing the source of propulsive power).

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Appendix E - Certification Basis Documentation

ANNEX 2: PART-25 Product Key Characteristics Documentation example

[INTRODUCTION]

- RTD1 = Original TC Configuration and RTD1 Configuration = BP1 Configuration
- BP11 = BP1 fitted with major significant design change A with no alteration/no modification of the RTD1; leading to a new baseline product identifier
- RTD2 = Additional RTD and RTD2 Configuration = BP2 Configuration
- BP2 fitted with change C = BP2 fitted with major not significant design change C

[TABLE / TEXT TO BE INCORPORATED]

RTD Ref. n°	RTD Configuration Identifier	BP Ref. n°	BP Configuration Identifier	Criteria 1	Criteria 2							Criteria 3	Criteria 4	Criteria 5	
					fuselage circumference *	fuselage length*	wing area*	horizontal tail plane area*	vertical tail plane area*	wing sweep*	airframe-level			Maximum Take-off Thrust *	Maximum Take-off Weight *
RTD1	[id RTD1]	BP1	[id BP1]	see Notes							see Notes	see Notes	see Notes		
RTD1	[id RTD1]	BP11	[id BP11]	see Notes							see Notes	see Notes	see Notes		
RTD2	[id RTD2]	BP2	[id BP2]	see Notes							see Notes	see Notes	see Notes		
RTD2	[id RTD2]	BP2	[id BP2] fitted with change C	see Notes							see Notes	see Notes	see Notes		

*Numerical value

Notes:

Criteria 1 – Description of main physical configuration and overall construction

[Descriptive Section]

Preamble: Criteria 1 addresses Changes to an aircraft’s main physical configuration (e.g., low to high wing or empennage), addition of aero lifting new surfaces (e.g., canards), different fuselage cross section (e.g., double deck vs single deck), different wing planform (e.g., blended wing), number and location of engines, or overall construction (e.g., going from a metallic to a full composite airframe).

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 2 – Airframe and Structural Configuration

[Descriptive Section]

Preamble: Airframe-level change addresses, for example, fuselage integrated wing carry-thru structure vs. wing carry-thru external to fuselage, airframe structure provisions for a change in engine number and position.

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 3 – Aircraft Systems

[Descriptive Section]

Preamble: Criteria 3 addresses changes across aircraft systems that execute critical product level functions extensively impacting either:

- *the overall product’s architecture (driving extensive architectural changes) and integration across multiple systems, or*
- *critical aspects of the flight crew human-machine interface at a product level.*

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 4 – Power

[Descriptive Section]

Preamble: Criteria 4 generally addresses change in engine using different principles of propulsion or operation.

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Appendix F - Certification Basis Documentation

ANNEX 3: PART-27 and PART-29 Product Key Characteristics Documentation example

[INTRODUCTION]

- RTD1 = Original TC Configuration and RTD1 Configuration = BP1 Configuration.
- BP11 = BP1 fitted with major significant design change A with no alteration/no modification of the RTD1; leading to a new baseline product identifier.
- RTD2 = Additional RTD and RTD2 Configuration = BP2 Configuration.
- BP2 fitted with change C = BP2 fitted with major not significant design change C.

[TABLE / TEXT TO BE INCORPORATED]

RTD Ref. n°	RTD Configuration Identifier	BP Ref. n°	BP Configuration Identifier	Criteria 1	Criteria 2				Criteria 3	Criteria 4	Maximum Take-off Power *	Maximum Take-off Weight *
					fuselage circumference*	fuselage length*	main rotor diameter / main rotor blade surface area*	airframe-level				
RTD1	[id RTD1]	1	[id BP1]	see Notes				see Notes	see Notes	see Notes		
RTD1	[id RTD1]	BP11	[id BP11]	see Notes				see Notes	see Notes	see Notes		
RTD2	[id RTD2]	BP2	[id BP2]	see Notes				see Notes	see Notes	see Notes		
RTD2	[id RTD2]	BP2	[id BP2] fitted with change C	see Notes				see Notes	see Notes	see Notes		

*Numerical value

Notes:

Criteria 1 – Description of main physical configuration and overall construction

[Descriptive Section]

Preamble: Criteria 1 addresses Changes to an aircraft’s main physical configuration (e.g., number and location of engines and rotors) or overall construction (e.g., going from a full metallic to a full composite airframe).

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 2 – Airframe and Structural Configuration

[Descriptive Section]

Preamble: Airframe-level change addresses change to incorporate an additional rotor system

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 3 – Aircraft Systems

[Descriptive Section]

Preamble: Criteria 3 addresses changes across aircraft systems that execute critical product level functions extensively impacting either:

- *the overall product’s architecture (driving extensive architectural changes) and integration across multiple systems, or*
- *critical aspects of the flight crew human-machine interface at a product level*
 - [Description of RTD1]: Describe RTD1.
 - [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
 - [Description of RTD2]: Describe RTD2 in a written format.
 - [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Criteria 4 – Principles of propulsion or operations

[Descriptive Section]

Preamble: Criteria 4 addresses change in engine using completely different principles of propulsion or operation.

- [Description of RTD1]: Describe RTD1.
- [Description of BP11]: Identify the changes with respect to RTD1 in a written format.
- [Description of RTD2]: Describe RTD2 in a written format.
- [Description of BP2 fitted with change C]: Identify the changes with respect to RTD2 in a written format.

Appendix G - Certification Basis Documentation

ANNEX 4: FAA DRAFT Order_8110.123 - Type Certificate Data Sheet Procedures

FAA DRAFT Order_8110.123 - Type Certificate Data Sheet Procedures

Chapter 2. Policy and Procedures Applicable to All Products

6. Certification Basis.

a. Define the applicable regulations and amendments ~~and the effective date~~ of the applicable 14 CFR sections, ~~including Special Federal Aviation Regulations (SFAR) if applicable.~~

b. Include optional regulatory requirements with which the product has complied ~~or not~~; for example, ditching, ice protection, and ETOPS.

c. Include all special conditions, exemptions, ELOS findings, ~~Elect-to-comply~~, and ADRCs for each approved make/model/series. See Order 8110.4 for definitions of these items. Suggested means to document this information as provided below.

- (1) Special Conditions. For each special condition, list the special condition number, ~~and the special condition title, and the effective date of the special condition.~~

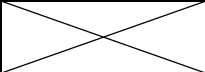
Table 2-1. Special Conditions Documentation Example

Special Condition No.	Title	Effective Date
25-347-SC	Interaction of Systems and Structures	3/19/2007

- (2) Exemptions. For each exemption, list the exemption number, applicable airworthiness standard, ~~and exemption subject/title, and date issued.~~ For a time-limited grant of exemption, list the expiration date(s). If the grant of exemption is specific to certain serial numbers or line numbers, include these limitations. As an example:

Table 2-2: Exemptions Documentation Example

Exemption No	Applicable 25 Section	Part	Exemption Title	Date Issued	Comment
17241	25.901(c), 25.981(a)(3)		Time Limited Exemption – Fuel Tank Electrostatic Protection for FQIS	3/1/2017	Exemption for 737MAX: Applicable to first 36 aircraft produced.
17825	25.1309(b)		Non-Rechargeable Lithium Batteries for Emergency	05/08/2018	Exemption expires on 05/08/2020.

		Locator Transmitter installations in Life Rafts		
--	--	---	---	--

Note: Some older products may not have an exemption number. In such cases, put an em dash (—) in place of the exemption number

(3) Equivalent Level of Safety (ELOS). For each ELOS, list the regulations requiring an ELOS, the title of the ELOS memorandum, and the ELOS memorandum number. Here is an example:

Table 2-3. Equivalent Level of Safety Documentation Example

Regulations Requiring an ELOS Finding	ELOS Title	ELOS Memo No.
25.123(a), 25.123(b)	En Route Climb Speed	PS12-0038-F-3

(4) Elect-to-comply: Each elect-to-comply shall be recorded, as applicable. It shall not be referenced as dedicated “Elect to Comply” but as the applicable 14 CFR paragraphs with the elected higher amendment and condition if applicable since it is formally part of the Certification Basis and shall not be misinterpreted as a voluntary requirement for later changes.

(5) ADRCs. For each ADRC list the ADRC number, subject, and the requirement or condition. If the ADRC is documented in a § 21.101(b)(3) Impractical exception, list the applicable memorandum number. Here is an example:

Table 2-x. Additional Design Requirement and Condition Documentation Example

Regulations Requiring an ADRC Finding	ADRC No.	ADRC Description (no proprietary or sensitive information)	IE/ADRC Memo No. (if applicable)
25.xxxx(y)(z)	ADRC-25.xxxx(y)(z)	ADRC Description	PSxx-yyyy-zz

PRODUCT DESIGNATION

CHAPTER - CERTIFICATION BASIS

SUB-CHAPTER - ADDITIONAL DESIGN REQUIREMENTS AND CONDITIONS:

The following design details or information must be maintained to ensure that an unsafe design condition is not present.

Or

The following design features, requirements and information are included as part of the [product] certification basis. If this item is not maintained, compliance must be shown with the latest 14 CFR part 23 / 25 / 27 / 29 / 33 / 35 requirement(s) as amended by Amendment 23-1 / 25-1 / 27-1 / 29-1 / 33-1 / 35-1 through Amendment 23-xxxx / 25-xxxx / 27-xxxx / 29-xxxx / 33-xxxx / 35-xxxx.

- ADRC-23.xxxx / 25.xxxx / 27.xxxx / 29.xxxx / 33.xxxx / 35.xxxx [amdt level] – Title of the requirement:

[Describe the Additional Design Requirements and Conditions (ADRC) that are part of the certification basis [per RECA16]. The ADRC text is approved by the FAA [per RECA27] and recorded in the TCDS at a level that allows the design feature to be maintained that ensures their continued maintenance and oversight, but does not contain proprietary information.]

Appendix H - Certification Basis Documentation

ANNEX 5: FAA Order_8110.48A - How to Establish the Certification Basis for Changed Aeronautical Products

Proposed changes to 8110.48A are provided below.

Example of TCDS for Amended TC Changes for Part 25**II. 787-9, Transport Category, Approved June 13, 2014**

Certification Basis: 14 CFR Part 25, Airworthiness Standards, Amendment 25-1 through 25-128, with exceptions as noted below.

<u>Section No.</u>	<u>Title</u>	<u>At Amdt. 25-</u>
25.107	Takeoff Speeds	135
25.795(b)(1)	Security considerations	N/A
25.795(c)(2)	Security considerations	N/A
25.795(c)(3)(i)	Security considerations	N/A
25.125(b)(2)(ii)(B)	Landing	108
25.1317	remains at FAA Special Condition 25-354A-SC for the Integrated Standby Flight Display (ISFD)	

14 CFR Part 26, Based on 14 CFR §21.101(g) for changes made to TCs applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections.

Compliance has been found for the following regulations through Amendment 26-5, for §§ 26.21, 26.37, 26.43, and 26.45

1. Fuel Venting and Exhaust Emission Requirements for Category A aircraft, through Amendment 34-5. The certification basis includes compliance to the International Civil Aviation Organization (ICAO) Annex 16, Volume II, Third Edition, Amendment 2 for SN, Section 2.3.2 for CO and HC, Section 2.3.3 for NO_x (known as CAE P/8), and Part II Chapter 2 for fuel venting. Compliance has been demonstrated.

14 CFR Part 36, Noise Certification and Airworthiness Certification, Amendment 36-28. The certification basis for noise is based on ICAO Annex 16, Volume I, Chapter 4, Amendment 16.

The Following Optional Design Requirements are included with:

Ditching: 14 CFR §§ 25.801, 25.1411(b)

Ice Protection: 14 CFR § 25.1419

ETOPS: The 787-9 has been evaluated in accordance with the design requirements of 14 CFR § 25.3(b) and found suitable for greater than 180-minute operations when operated and maintained in accordance with Boeing Document No. D021Z002-01, "Model 787-9 ETOPS Configuration, Maintenance, and Procedures." This finding does not constitute approval to conduct ETOPS.

Exemptions from 14 CFR Part 25:

1. Grant of Exemption, § 25.562(b)(2), Relief from floor warpage testing requirements for flightdeck seats on the Boeing Model 787 series airplanes; **Exemption No. 9486**, September 11, 2007.
2. Grant of Exemption, § 25.809(a), Relief from the requirement that flightcrew emergency exits have a means to view outside conditions under all lighting situations for the Boeing Model 787 series airplanes; **Exemption No. 10114**, August 11, 2010.

Equivalent Levels of Safety (ELOS) are identified as:

TC6918SE-T-A-9 Continuous	§§ 25.341, 25.343, 25.345, 25.371, 25.373, and 25.391	ELOS Finding for Gust and Turbulence Design Loads
TC6918SE-T-A-10	§ 25.335(b)	ELOS Finding for Design Airspeeds

respect to the following subjects apply to the Model 787-9:

<u>Subject</u>	
25.303-1	Composite Wing and Fuel Tank Structure—Fire Protection Requirements
25-354A-Section 1	Control Surface Awareness, High Intensity (HF) Protection, Limit Engine Torque Stoppage, and Design Roll
25.303-1	Maximum Ramp Weight

ADDITIONAL DESIGN REQUIREMENTS:

The following design details or information must be provided to ensure that an unsafe design condition is not present:

In-flight Engine Restart

The Boeing Model 787 engines incorporate numerous design features intended to increase efficiency and reliability. However, some of these features have the potential to decrease engine in-flight starting performance. The engines envisioned when the applicable sections of 14 CFR Part 25 were promulgated. The following criteria for engine in-flight starting performance must be met to ensure that the level of safety intended by §§ 25.903(e) and 25.1351(d) is maintained on airplanes powered by current technology engines.

1. Appropriate procedures for restarting the engines in the following cases must be provided in the airplane flight manual (AFM):
 - a. a fuel cut during climb after the takeoff phase (defined as the flight phase from start of the takeoff roll to 1500 feet above the runway altitude),

- b. loss of all alternating current (AC) power in combination with an all engine flameout, and c. all engine flame-out at or below 20,000 feet.

Uncontrollable High Engine Thrust or Power

Numerous single and anticipated combinations of failures within traditional engine control systems result in losing the normal means to control the magnitude and/or direction of engine thrust (power). For some of these anticipated failure conditions, the flight crew cannot be relied upon to recognize and mitigate the failures before they become hazardous or catastrophic. The following design features are required to ensure an unsafe condition does not exist with regards to the loss of the normal means to control engine thrust (power):

1. Dual channel full authority digital electronic (engine) control (FADEC) which monitors engine conditions to trim fuel flow
2. Thrust control malfunction accommodation to address conditions where fuel metering is not responding to pilot input on the ground, and Redundant mechanical control interface between the flight crew and the FADEC.

SECTION TO BE REMOVED IN ITS ENTIRETY

features must be incorporated in the type design. In lieu of §§ 25.795(b)(1), (c)(2) and (c)(3), Amendment 25-127, b.

that is Sec.

The Boeing Model 787-9 exception per 14 CFR 21.101(b) for §§25.795(b)(1), (c)(2) design feature similar to but not equivalent to their intent must be in consideration in any subsequent type design change to ensure the level of safety designed into the 787-9 is not reduced. Features that reduce flight critical system separation or adverse effects must be in consideration for prevention, system separation and protections for secondary compartment stowage compartments are not acceptable.

Appendix I - Examples of Substantial, Significant, and Not Significant Changes

This appendix includes examples of substantial, significant, and non-significant changes to part 23, 25, 27, and 29 products.

Examples - Part 23: Substantial

Example	Description of change	Notes	ARC Comments
1	Change in wing location (tandem, forward, canard, high/low).	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.	No alteration from current AC 21.101-1B
2	Fixed wing to tilt wing.	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.	No alteration from current AC 21.101-1B
3	A change in the number of engines.	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.	No alteration from current AC 21.101-1B
4	Replacement of piston or turbo-prop engines with turbojet or turbofan engines.	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.	No alteration from current AC 21.101-1B
5	Change in engine configuration (tractor/pusher).	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.	No alteration from current AC 21.101-1B
6	Increase from subsonic to supersonic flight regime.		No alteration from current AC 21.101-1B
7	Change from an all-metal to all-composite airplane.	Proposed change in design is so extensive that a substantially complete investigation of compliance applicable regulations is required.	No alteration from current AC 21.101-1B
8	Certificating a part 23 (or predecessor amendment airplane basis airplane such as	This does not include change of level (or category) within part 23.	No alteration from current AC 21.101-1B

Example	Description of change	Notes	ARC Comments
	CAR 3) into another regulatory category such as part 25.		
NEW EXAMPLE:			
1	Addition of Highly Complex Integrated Systems e.g., control by power, fully autonomous.	Flight direction is controlled by thrust and power (i.e., completely new control scheme)	New example

Examples - Part 23: Significant

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
1	Conventional tail to T-tail or V-tail, or vice versa.	Yes	No	Yes	Change in general configuration. Requires extensive, structural flying qualities and performance reinvestigation. Requires new airplane flight manual (AFM) to address performance and flight characteristics.	No alteration from current AC 21.101-1B
2	Changes in wing configuration such as change in dihedral, changes in wing span, flap or aileron span, addition of winglets, or increase of more than 10 percent of the original wing sweep at the quarter chord.	Yes	No	Yes	Change in general configuration. Likely requires extensive changes to wing structure. Requires new AFM to address performance and flight characteristics. Note: Small changes to the wingtip or winglet are not significant changes. See table for “not significant” changes.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
3	Changes to tail configuration such as the addition of tail strakes or angle of incidence of the tail.	Yes	No	Yes	Change in general configuration. Likely requires extensive changes to tail structure. Requires new AFM to address performance and flight characteristics. Note: Small changes to tail are not significant changes.	No alteration from current AC 21.101-1B
4	Tricycle/tail wheel undercarriage change or addition of floats.	Yes	No	No	Change in general configuration. Likely, at airplane level, general configuration and certification assumptions remain valid.	No alteration from current AC 21.101-1B
5	Passenger to freighter configuration conversion that involves the introduction of a cargo door or an increase in floor loading of more than 20 percent, or provision for carriage of passengers and freight together.	Yes	No	Yes	Change in general configuration affecting load paths, aeroelastic characteristics, aircraft related systems, etc. Change in design assumptions.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
6	Replace reciprocating engines with the same number of turbo-propeller engines.	Yes	No	No	Requires extensive changes to airframe structure, addition of aircraft systems, and new AFM to address performance and flight characteristics.	No alteration from current AC 21.101-1B
7	Addition of a turbo-charger that changes the power envelope, operating range, or limitations.	No	No	Yes	Invalidates certification assumptions due to changes in operating envelope and limitations. Requires new AFM to address performance and flight characteristics.	No alteration from current AC 21.101-1B
8	The replacement of an engine of higher rated power or increase thrust would be considered significant if it would invalidate the existing substantiation, or would change the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the assumptions of certification.	No	Yes	Yes	Invalidates certification assumptions. Requires new AFM to address performance and flight characteristics. Likely changes to primary structure. Requires extensive construction reinvestigation.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
9	A change in the type of material, such as composites in place of metal, or one composite fiber material system with another (e.g., carbon for fiberglass), for primary structure would normally be assessed as a significant change.	No	Yes	Yes	Change in principles of construction and design from conventional practices. Likely change in design/certification assumptions.	No alteration from current AC 21.101-1B
10	A change involving appreciable increase in design speeds V_D , V_B , V_{MO} , V_C , or V_A .	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.	No alteration from current AC 21.101-1B
11	Installation of a short takeoff and landing (STOL) kit.	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.	No alteration from current AC 21.101-1B
12	A change in the rated power or thrust could be a significant change if the applicant is taking credit for increased design	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
	speeds per example 10 of this table.					
13	Fuel state such as compressed gaseous fuels or fuel cells. This could completely alter the fuel storage and handling systems and possibly affect the airplane structure.	No	No	Yes	Changes in design/certification assumptions. Extensive alteration of fuel storage and handling systems.	No alteration from current AC 21.101-1B
14	A change in the flight control concept for an aircraft, e.g., to fly by wire (FBW) and side-stick control, or a change from hydraulic to electronically actuated flight controls, would in isolation normally be regarded as a significant change.	No	No	Yes	Changes in design and certification assumptions. Requires extensive systems architecture and integration reinvestigation. Requires new AFM.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
15	Change to airplane's operating altitude, or cabin operating pressure greater than 10 percent in maximum cabin pressure differential.	No	No	Yes	This typically invalidates certification assumptions and the fundamental approach used in decompression, structural strength, and fatigue. May require extensive airframe changes affecting load paths, fatigue evaluation, aeroelastic characteristics, etc. Invalidates design assumptions.	No alteration from current AC 21.101-1B
16	Addition of cabin pressurization system.	No	Yes	Yes	Extensive airframe changes affecting load paths, fatigue evaluation, aeroelastic characteristics, etc. Invalidates design assumptions.	No alteration from current AC 21.101-1B
17	Changes in types and number of emergency exits or an increase in maximum certificated passenger capacity.	Yes	No	Yes	Emergency egress requirements exceed those previously substantiated. Invalidates assumptions of certification.	No alteration from current AC 21.101-1B
18	A change in the required number of flightcrew that necessitates a complete flightdeck rearrangement, and/or an	No	No	Yes	Extensive changes to avionics and aircraft systems. Invalidates certification assumptions. Requires new AFM.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
	increase in pilot workload.					
19	Expansion of an aircraft's operating envelope.*	No	No	Yes* *Some changes may be deemed "not significant" depending on the extent of the expansion.	An expansion of operating capability is a significant change (e.g., an increase in maximum altitude limitation, approval for flight in icing conditions, or an increase in airspeed limitations).	No alteration from current AC 21.101-1B
20	Replacement of an aviation gasoline engine with an engine of approximately the same horsepower utilizing, e.g., diesel, hybrid, or electrical power.	No	No	Yes	A major change to the airplane. The general configuration and principles of construction will usually remain valid; however, the assumptions for certification are invalidated.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
21	Comprehensive flightdeck upgrade, such as conversion from entirely federated, independent electro-mechanical flight instruments to highly integrated and combined electronic display systems with extensive use of software and/or complex electronic hardware.	No	No	Yes	Affects avionics and electrical systems integration and architecture concepts and philosophies. This drives a reassessment of the human-machine interface, flightcrew workload, and re-evaluation of the original design flightdeck assumptions.	No alteration from current AC 21.101-1B
22	Introduction of autoland.	No	No	Yes	Invalidates original design assumptions.	No alteration from current AC 21.101-1B
23	Conversion from a safe life design to a damage-tolerance-based design.	No	No	Yes	Where the airframe-established safe life limits change to damage tolerance principles, then use of an inspection program in lieu of the safe life design limit invalidates the original assumptions used during certification.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
24	Extensive structural airframe modification, such as a large opening in the fuselage.	Yes	No	No	Requires extensive changes to fuselage structure, affects aircraft systems, and requires a new AFM to address performance and flight characteristics.	No alteration from current AC 21.101-1B
25	Fuselage stretch or shortening in the cabin or pressure vessel, <u>including change in fuselage diameter.</u>	Yes	No	Yes	Cabin interior changes are related changes since occupant safety considerations are impacted by a cabin length change. Even if a new cabin interior is not included in the product level change, the functional effect of the fuselage plug has implications on occupant safety (e.g., the dynamic environment in an emergency landing, emergency evacuation, etc.), and thus the cabin interior becomes an affected area.	Complemented the example, including the fuselage diameter.

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
26	Conversion from normal category to commuter category airplane.	Yes	No	Yes	Requires compliance with all commuter regulatory standards. In many cases, this change could be considered a substantial change to the type design. Therefore, a proposed change of this nature would be subject to FAA determination under § 21.19.	No alteration from current AC 21.101-1B
27	Installation of a full authority digital engine control (FADEC) on an airplane that did not previously have a FADEC installed.	No	No	Yes		No alteration from current AC 21.101-1B
NEW EXAMPLES:						
1	Addition of Winglet-Winglet and outboard wing reinforcement.	Yes	No	Yes	The addition of the winglet required a reduction in the maneuver load factors which resulted in structural changes in the wing, thereby making it significant.	New example

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
2	Change of stall warning and/or stall performance due to introduction of “load neutral” winglets	Yes	No	Yes	Significant if it requires extensive changes to wing structure or aircraft systems, or if it requires a new AFM to address performance and flight characteristics. It may also affect the wing fuel tanks, including fuel tank lightning protection, fuel tank ignition source prevention, and fuel tank flammability exposure.	New example The topic of winglets may deserve special treatment since their addition affects many disciplines but, depending on the design, the effects may only be significant for one area. Whether a significant structural impact could drive otherwise unchanged flight characteristics to newer rules (or vice versa) is something that could use

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
						clarification. Change of stall warning and/or stall performance should be considered a secondary change and thus may not be significant even if the primary change were significant. However if the winglets were cosmetic, small enough and shaped correctly, would likely be considered not significant. However, if

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
						addition of load alleviation/flight characteristics augmentation system were required, the addition of the winglets would be significant.

Examples - Part 23: Not Significant

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
1	Addition of wingtip modifications (not winglets).	No	No	No	A major change to the airplane. Likely, the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B
2	Installation of skis or wheel skis.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B
3	Forward-looking infrared (FLIR) or surveillance camera installation.	No	No	No	Additional flight or structural evaluation may be necessary, but the change does not alter basic airplane certification.	No alteration from current AC 21.101-1B
4	Litter, berth, and cargo tie down device installation.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
5	Increased tire size, including tundra tires.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
6	Replacement of one propeller type with another (irrespective of increase in number of blades).	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B
7	Addition of a turbo-charger that does not change the power envelope, operating range, or limitations (e.g., a turbo-normalized engine, where the additional power is used to enhance high altitude or hot day performance).	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
8	Substitution of one method of bonding for	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
	another (e.g., change in type of adhesive).					
9	Substitution of one type of metal for another.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
10	Any change in construction or fastening not involving primary structure.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
11	A new fabric type for fabric-skinned aircraft.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
12	Increase in flap speed or undercarriage limit speed.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B
13	Structural strength increases.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction,	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
					and certification assumptions remain valid.	
14	Instrument flight rules (IFR) upgrades involving installation of components (where the original certification does not indicate that the airplane is not suitable as an IFR platform, e.g., special handling concerns).	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
15	Fuel tanks where fuel is changed from gasoline to diesel fuel and tank support loads are small enough that an extrapolation from the previous analysis would be valid. Chemical compatibility would	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
	have to be substantiated.					
16	Limited changes in a pressurization system, e.g., number of outflow valves, type of controller, or size of pressurized compartment, but the system must be re-substantiated if the original test data are invalidated.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B
17	Install a different exhaust system.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
18	Changes in engine cooling or cowling.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
19	Changing fuels of substantially the same type, such as AvGas to AutoGas,	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction,	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
	AvGas (80/87) to AvGas (100LL), ethanol to isopropyl alcohol, Jet B to Jet A.				and certification assumptions remain valid.	
20	Fuels that specify different levels of “conventional” fuel additives that do not change the primary fuel type. Different additive levels (controlled) of MTBE, ETBE, ethanol, amines, etc., in AvGas would not be considered a significant change.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B
21	A change to the maximum takeoff weight of less than 5 percent, unless assumptions made in justification of the	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
	design are thereby invalidated.					
22	An additional aileron tab (e.g., on the other wing).	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B
23	Larger diameter flight control cables with no change in routing, or other system design.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
24	Autopilot installation (for IFR use, unless the original certification indicates that the airplane is not suitable as an IFR platform).	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
25	Increased battery capacity or relocate battery.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
26	Replace generator with alternator.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
27	Additional lighting (e.g., navigation lights, strobes).	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
28	Higher capacity brake assemblies.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
29	Increase in fuel tank capacity.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
30	Addition of an oxygen system.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
31	Relocation of a galley	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
32	Passenger to freight (only) conversion with no change to basic fuselage structure.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction, and certification assumptions	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
					remain valid. Requires certification substantiation applicable to freighter requirements. <u>Reduction in passenger capacity allows deactivation of emergency exits.</u>	
33	New cabin interior with no fuselage length change.	No	No	No		No alteration from current AC 21.101-1B
34	Installation of new seat belt or shoulder harness.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
35	A small increase in center of gravity (CG) range.	No	No	No	At airplane level, no change in general configuration, principles of construction, and certification assumptions.	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
36	Auxiliary power unit (APU) installation that is not flight essential.	No	No	No	Although a major change to the airplane level, likely the original general configuration, principles of construction, and certification assumptions remain valid. Requires certification substantiation applicable to APU installation requirements.	No alteration from current AC 21.101-1B
37	An alternative autopilot.	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
38	Addition of Class B terrain awareness and warning systems (TAWS).	No	No	No	Not an airplane-level change.	No alteration from current AC 21.101-1B
39	Extending an established life limit.	No	No	No	This extension may be accomplished by various methods, such as ongoing fatigue testing, service life evaluation, component level replacement, and inspections	No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
					based on damage tolerance principles.	
40	Flightdeck replacement of highly integrated and combined electronic display systems with other highly integrated and combined electronic display systems.	No	No	No	Not significant if the architecture concepts, design philosophies, human-machine interface, or flight crew workload assumptions are not impacted.	No alteration from current AC 21.101-1B
41	Interior cabin reconfigurations are generally considered not significant. This includes installation of in-flight entertainment (IFE), new seats, and rearrangement of furniture.	No	No	No		No alteration from current AC 21.101-1B

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
42	Modification to ice protection systems.	No	No	No	Re-certification required, but certification basis should be evaluated for adequacy.	No alteration from current AC 21.101-1B
NEW EXAMPLES:						
1	Upgrade highly integrated avionics with highly integrated avionics	No	No	No	The assumptions used to certify a highly integrated avionics system should be the same for another highly integrated avionics system. Note: May include addition of touch screen capability to integrated avionics.	New example
2	Autothrottle	No	No	No	Not an airplane-level change.	New example It agrees with SAIL.

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
3	Emergency Autoland	No	No	No	The classification as Not Significant relies on the assumption that the pilot is incapacitated and that the function is not intended for use during normal or abnormal operating conditions.	New example
4	Improved Diagnostics	No	No	No	Inclusion of upgraded equipment to support enhanced diagnostic capabilities. Not an airplane-level change.	New example
5	Increased Aircraft Connectivity	No	No	No	New equipment that added new aircraft connectivity capabilities. Not an airplane-level change.	New example
6	Windshield Heat Controller Replacement	No	No	No	Upgrade the windshield heat controller to new unit. Not an airplane-level change.	New example

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
7	Lithium-Ion Battery	No	No	No	Add new main ship battery using lithium ion technology. Not an airplane-level change.	New example Other Aircraft indicating prior approved installations, in similarly protected environment.
8	Digital Flight Management System (FMS) Controller	No	No	No	Upgrade of FMS. Not an airplane-level change.	New example
9	Add Engine Low Oil Pressure Switch	No	No	No	New I/O for increased monitoring. Not an airplane-level change.	New example
10	Wing Skin Splice material change	No	No	No	No structural change, completed for corrosion prevention. Not an airplane-level change.	New example
11	MLG Trailing Link & Axle Changes	No	No	No	No structural change, completed for corrosion prevention.	New example

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
					Not an airplane-level change.	
12	Cockpit Interior Update	No	No	No	No structural changes. Not an airplane-level change.	New example
13	Cockpit Environmental Control System Ducting Improvement	No	No	No	Updates to ducting to improve airflow and balance. Not an airplane-level change.	New example
14	Cabin / Cockpit Acoustic Treatment Update	No	No	No	Different material for improved sound dampening. Not an airplane-level change.	New example
15	Windshield and Cockpit Side Window UV filtering	No	No	No	New coating for UV protection, no structural differences. Not an airplane-level change.	New example
16	Windshield Seal & Installation Improvement	No	No	No	No structural change, completed for corrosion prevention. Not an airplane-level change.	New example

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
17	Service Air Check Valve	No	No	No	Maintenance improvement. Not an airplane-level change.	New example
18	Nose Gear Shimmy Damper	No	No	No	Maintenance improvement. Not an airplane-level change.	New example
19	Maintenance Interval	No	No	No	Maintenance improvement. Not an airplane-level change.	New example Does not include ALIM changes.
20	Acoustic Pylon Treatment	No	No	No	Acoustic improvement. Not an airplane-level change.	New example
21	Add Broadband System	No	No	No	Cabin entertainment addition. Not an airplane-level change.	New example Will also impact need for antennas.
22	New Flight Data Recorder	No	No	No	New equipment or replace existing unit.	New example

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
					Not an airplane-level change.	
23	New Cockpit Voice Recorder	No	No	No	New equipment or replace existing unit. Not an airplane-level change.	New example
24	Remove Pressure Transducer from Vapor Cycle Cooling System	No	No	No	Maintenance improvement. Not an airplane-level change.	New example
25	Added Auxiliary Battery	No	No	No	New battery to provide additional battery power during ground operations. Not an airplane-level change.	New example
26	Changes to <u>existing</u> FADEC SW	No	No	No	It does not change the overall product configuration or the original certification assumptions. Not an airplane-level change.	New example
27	Addition of Unattended APU Operation	No	No	No	Basic principles of APU operation remain unchanged	New example

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
					and no change to original certification assumptions. Not an airplane-level change.	
28	Winglet secondary non-significant changes; Change to wingtip position/anti-collision lights; Change to wing anti-ice system exhaust	No	No	No	Not an airplane-level change.	New example
29	Fuel volume increase by changing the standpipe	No	No	No	Not an airplane-level change.	New example
30	Engine Durability improvements	No	No	No	Not an airplane-level change.	New example
31	Cabin pressurization system change from electropneumatic to all electronically controlled	No	No	No	Not an airplane-level change.	New example

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
32	Hydraulic reservoir moved out of the rotor non-containment zone in the tailcone to a flammable fluid zone in the aft fairing.	No	No	No	Not an airplane-level change.	New example
33	Wing inspection lights changed from halogen to LED.	No	No	No	Not an airplane-level change.	New example
34	Approval for takeoff and landing on unpaved surfaces	No	No	No	Not an airplane-level change.	New example
35	Change stall speed basis from conventional stall speeds (VS) to reference stall speeds (VSR).	No	No	No	Not an airplane-level change.	New example
36	Addition or upgrade of datalink systems including position	No	No	No	Not an airplane-level change.	New example

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
	reporting and ADS-C systems.					May impact antenna installations
37	Adding or upgrading ground situational awareness (Taxi/runway position) or performance monitoring systems (such as ROAAS)	No	No	No	Not an airplane-level change.	New example
38	<u>Integrated Modular Avionics (IMA)</u>	<u>No</u>	<u>No</u>	<u>No</u>	The basic functionality of the systems is unchanged. No change from analogue to digital. Not an airplane-level change.	New example This example was already included in the Initial Issue of EASA AMC and GM to Part 21.

Examples - Part 25: Substantial

Example	Description of change	Notes
1	Change in the number or location of engines, e.g., four to two wing-mounted engines or two wing-mounted to two body-mounted engines.	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required. The change will affect the aircraft main physical configuration, require extensive airframe and structural changes and impact aircraft system architecture and human-machine interface. Therefore, the proposed change in design is so extensive that a substantially complete demonstration of compliance with the applicable regulations is required.
2	Change from a high-wing to low-wing configuration.	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required. The change will affect the aircraft main physical configuration, require extensive airframe and structural changes and impact aircraft system architecture and potentially human-machine interface. Therefore, the proposed change in design is so extensive that a substantially complete demonstration of compliance with the applicable regulations is required.
3	Change from an all-metal to all-composite airplane.	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required. The change will affect the aircraft main physical configuration, require extensive airframe and structural changes and impact aircraft system architecture. Therefore, the proposed change in design is so extensive that a substantially complete demonstration of compliance with the applicable regulations is required.
4	Change of empennage configuration for larger airplanes (cruciform vs. "T" or "V" tail).	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required. The change will affect the aircraft main physical configuration, require extensive airframe and structural changes and impact aircraft system architecture and potentially human-machine interface. Therefore, the proposed change in design is so extensive that a substantially complete demonstration of compliance with the applicable regulations is required.
5	Increase from subsonic to supersonic flight regime.	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable regulations is required. The change will affect the aircraft principle of propulsion, require extensive airframe and structural changes, impact aircraft system architecture and human-machine interface. Therefore, the proposed change in design is so extensive that a substantially complete demonstration of compliance with the applicable regulations is required.

Examples - Part 25: Significant

Example	Description of change	Change to the general configuration?	Change to the principles of construction?	Assumptions used for certification invalidated?	Notes
1	Reduction in the number of flightcrew (in conjunction — or not — with flightdeck update).	No	No	Yes	Primary characteristic invalidating the assumptions: Significant impact on crew workload, human factors and pilot type rating need to be considered. Secondary characteristic: May or may not need extensive changes to avionics and aircraft systems.
2	Modify an airplane to add certification for flight in icing conditions by adding systems such as ice detection and ice protection. Initial certification for flight into known icing conditions.	Yes → No	No	Yes (see notes)	Some airplanes have existing design / operating capabilities incorporated within the baseline product. Achieving 'full flight in icing conditions' may not be a significant change on some airplanes. If the change is extensively affecting aircraft operating envelope, then the baseline product assumptions used for certification might be invalidated. Affects environmental factors at the product level which requires assessment of additional environmental hazards.
3	Conversion—passenger or combination freighter/ passenger to all freighter, including cargo door, redesign floor structure and 9g net or rigid barrier.	Yes	No	Yes	Extensive airframe changes affecting load paths, aeroelastic characteristics, aircraft related systems for fire protection, etc. Design Assumptions used for certification changed from passenger to freighter.
4	Conversion from a cargo to passenger configuration.	Yes	No	Yes	Completely new floor loading and design. Redistribution of internal loads, change in cabin safety requirements, system changes.
5	Increase in cabin pressurization greater of more than 10 percent.	No	No	Yes	A change greater than 10 percent in operational cabin pressure differential is a significant change since it requires extensive airframe changes affecting load paths, fatigue evaluation, or aeroelastic characteristics, invalidating the certification assumptions.

Classification	Example	Description of change	Change to the general configuration?	Change to the principles of construction?	Assumptions used for certification invalidated?	Notes
Not Significant	13	Initial installation of a non-essential APU.	No	No	No	A stand-alone initial APU installation on an airplane originally designed to use ground- or airport-supplied electricity and air conditioning. In this case, the APU would be an option to be independent of airport power.
Not Significant	14	Increasing the life limit as § 25.571 fatigue testing progresses for a recently type certificated airplane.	No	No	No	For example, a recently type certificated airplane may undergo fatigue testing as part of compliance with § 25.571. In this case, the TC holder may specify an initial life limit in the airworthiness limitations section (ALS) and gradually increase that life limit as fatigue testing progresses. Such change to the ALS is considered not significant.
Not Significant	15	Extending limit of validity (LOV) pursuant to § 26.23.	No	No	No	Extending an LOV pursuant to § 26.23 without any other change to the airplane is not a significant change. However, if extending the LOV requires a physical design change to the airplane, the design change is evaluated to determine the level of significance of the design change. Note that if design approval holders are developing modifications to support an extended LOV, they must also comply with the requirements of subpart E of part 26.
Not Significant	16	Airframe life extension.	No	No	No	This does not include changes that involve changes to design loads, such as pressurization or weight increases. Also, this does not include changing from safe life to damage tolerance
Not Significant	17	Changes in the type or number of emergency exits by de-rating doors or deactivating doors with	No	No	No	The new emergency egress does not exceed that previously substantiated because the certificated number of passengers is reduced.

Classification	Example	Description of change	Change to the general configuration?	Change to the principles of construction?	Assumptions used for certification invalidated?	Notes
		corresponding reduction in passenger capacity.				
Not Significant	18	Request for ETOPS type design approval for airplanes, with ETOPS provisions already included in the type design approval	No	No	No	A change to a product with an existing ETOPS type design approval without a change in diversion capability would normally not be significant. However, if the existing ETOPS type design approval was based on policy prior to the adoption of transport category ETOPS airworthiness standards, then there is not an adequate certification basis to evaluate the type design change for ETOPS. In this case, the change is still not significant, and the appropriate transport category ETOPS airworthiness standards would apply.
Not Significant	18a [NEW]	Request for ETOPS type design approval for airplanes, with ETOPS provisions already included in the type design approval	No	No	No	The assumptions used for certification should be the same at product level between the initial certification (provisions) and the post TC certification (“activation” of the ETOPS capability).
Not Significant	19	An avionics change from federated electro-mechanical displays to federated electronic displays.	No	No	No	Changing an electro-mechanical display to an electronic display is not considered significant.
Not Significant	20	An avionics change replacing an integrated avionics system with another integrated avionics system.	No	No	No	The assumptions used to certify a highly integrated avionics system should be the same for another highly integrated avionics system.
Not Significant	21 [NEW]	Installation of winglets --- or change to existing winglets --- having minimal changes to the	No	No	No	While a winglet-equipped airplane may have a distinguishable appearance as compared to the baseline, all key operating characteristics remain unchanged. However, should the applicant wish to take

Classification	Example	Description of change	Change to the general configuration?	Change to the principles of construction?	Assumptions used for certification invalidated?	Notes
		wing structure and fuel tanks, with the only purpose of improving fuel economy in cruise flight.				credit of improved takeoff, climb, obstacle clearance, the assumptions used for certification may have been invalidated. While takeoff and climb performance could be slightly improved, those "cruise winglets" hold the premise that no changes to the Performance section of the approved AFM are to be made.
Not Significant	22 [NEW]	Request for Autoland type design approval, with the Autoland provisions already included in the type design approval	No	No	No	The assumptions used for certification should be the same at product level between the initial certification (provisions) and the post TC certification ("activation" of the autoland capability).

Examples - Part 27 and 29: Substantial

Example	Description of Change	Notes	ARC Comments
1	Change to the number and / or configuration of rotors (e.g., main & tail rotor system to two main rotors).	The change will affect the aircraft main physical configuration, require extensive airframe and structural changes, and impact aircraft system architecture and human-machine interface. Therefore, the proposed change in design is so extensive that a substantially complete demonstration of compliance with the applicable regulations is required.	Notes updated to reflect the impacts based on the multi-factor objective criteria being proposed by the ARC.
2	A multi-factor change where ALL three items are changing: *Changing the number of main rotor blades. *MTOW increase of 40% or greater. *Changing from federated instruments to an integrated avionics system.	Change affects the system architecture, human-machine interface, aircraft structure and main rotor surface area. A substantially complete demonstration of compliance with the applicable regulations is required	

Examples - Part 27 and 29: Significant

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
1	Comprehensive flightdeck upgrade, such as conversion from entirely federated, independent electro-mechanical flight instruments to highly integrated and combined electronic display systems with extensive use of software and/or complex electronic hardware.	No Yes	No	Yes	General configuration of the cockpit is distinctly different from its predecessor. Affects avionics and electrical system interfaces which drives a reassessment of aircraft level hazards, human-machine interface, and flightcrew workload.	Changed to show the general configuration is impacted. Note revised to address both the general configuration and assumptions used for certification.
2	Initial certification for flight into known icing conditions.	No	No	Yes	Affects environmental factors at the product level which requires assessment of additional environmental hazards.	Note added to add explanation.
3	(Fixed) flying controls from mechanical to fly by wire.	No	No	Yes	Affects avionics and electrical system interfaces which drives a reassessment of aircraft level hazards, rotorcraft controllability, flight control failures, and human machine interface.	Note updated to identify the hazards to be assessed.

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
4	Addition of an engine; e.g., from single to twin or reduction of the number of engines; e.g., from twin to single.	Yes	Yes No	Yes	Changes the general configuration and makes the product distinguishable from its predecessor. Changes system interfaces which require a reassessment of aircraft level hazards, engine control system failures, and human machine interface.	Principles of construction are not changed in this case, other factors drive the significance. Added note to clarify the impact to the configuration and assumptions.
5.	A change of the rotor drive primary gearbox from a splash type lubrication system to a pressure lubricated system due to an increase in horsepower of an engine or changing from a piston engine to turbine engine.	No	Yes No	Yes No		Not a product level change and should be “Not Significant.” Type of lubrication system does not change the principles of construction or assumptions used for certification at the product level. A new example has been added to address transmission power changes.

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
6	A fuselage or tail boom modification that changes the primary structure, aerodynamics, and operating envelope sufficiently to invalidate the certification assumptions.	Yes	No	Yes	Product level change which makes the product distinguishable from its predecessor. Requires reassessment of the operating envelope and aircraft behavior.	Note added to address the two criteria that are triggered.
7	Application of an approved primary structure to a different approved model (e.g., Installation on a former model of the main rotor approved on a new model that introduces new materials or technology.	No	Yes	Yes	Principles of construction are changed due to new material or technology. Requires reassessment of the operating envelope and aircraft behavior.	Example revised to focus on the significant change and the note added to explain the triggering of the two criteria.

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
8	Emergency medical service (EMS) configuration with primary structural changes sufficient to invalidate the certification assumptions: Addition or expansion of external doors affecting primary structure.	NoYes	No	YesNo	Many EMS configurations will not be classified as significant. Modifications made for EMS are typically internal, and the general external configuration is normally not affected. These changes should not automatically be classified as significant. Note: Door addition or enlargement involving structural change would be significant. Addition or enlargement of doors makes the new product configuration distinguishable from its predecessor and requires complete reassessment of the structure.	Example should be based on the significant aspect which is the change of the door, not the fact that it's EMS. Recommend the example focus on the significant aspect and not EMS.
9	Skid landing gear to wheel landing gear or wheel landing gear to skid landing gear.	Yes	No	Yes	Product level change which makes the product distinguishable from its predecessor. May require reassessment of the operating envelope and aircraft behavior.	Note added to explain the two criteria that were triggered. Description clarified.
10	Change to the number of main rotor blades.	Yes	No	Yes	Product level change which makes the product distinguishable from its predecessor. Requires reassessment of the operating envelope and aircraft behavior.	Note added to explain the two criteria that were triggered.

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
11	Change tail anti-torque device (e.g., tail rotor, ducted fan or other technology).	Yes	Yes No	No Yes	Product level change which makes the product distinguishable from its predecessor. Requires reassessment of the operating envelope and aircraft behavior.	It's not clear in the example that the principles of construction are changed, but the configuration and assumptions are changed. Note added to explain the two criteria that were triggered.
12	Passenger configured helicopter to a Firefighting equipment configured helicopter with internal tanks requiring extensive internal modifications.	Yes	No	Yes	Depends on the firefighting configuration. Product level change which makes the product distinguishable from its predecessor. May require reassessment of the operating envelope and aircraft behavior.	Original example was carried from the FW with internal tanks. Most firefighting helicopter use external tanks or buckets which would not be significant changes. Addition of internal tanks (like FW) would be significant. Example modified to clarify.

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
13	Passenger configured helicopter to an agricultural configured helicopter with internal tanks requiring extensive internal modifications.	Yes	No	Yes	Depends on the firefighting configuration. Product level change which makes the product distinguishable from its predecessor. May require reassessment of the operating envelope and aircraft behavior.	Original example was carried from the Fixed Wing with internal tanks. Most agricultural helicopters use external spray tanks which would not be a significant change. Addition of internal tanks (like FW) would be significant. Example modified to clarify.
14	An initial Category A certification approval to an existing configuration.	No	No	Yes	Category A design and performance cannot be extrapolated from the original Category B design and performance. Changes system architecture which requires a reassessment of aircraft level hazards. Requires reassessment of the operating envelope and aircraft behavior.	Note added to clarify the change in assumptions.

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
15	An initial IFR certification approval to an existing configuration. IFR upgrades involving installation of upgraded components for new IFR configuration.	No	No	Yes	Requires reassessment of the hazards, rotorcraft handling, flight control failures and human machine interface.	The same exact example is Not Significant in Table A-9 with a different note. Recommend the example be made distinct from the Not Significant example.
16	Initial human external cargo (HEC) certification approval.	No	No	Yes	Affects aircraft operating conditions which requires assessment of new hazards not considered during the initial certification. Also significant if a new type of HEC system is certified.	Note added to explain the assumptions for certification.
17	Reducing the number of pilots for IFR from two to one.	No	No	Yes	Primarily relates to changes to pilot workload in IFR, but can be extended to other types of operation where the human machine interface or pilot workload is extensively impacted.	Example modified and explanation for the change in assumptions added.
18	A comprehensive avionics upgrade (other than flightdeck) that changes a federated avionics system to a highly integrated avionics system.	No	No	Yes	Affects avionics and electrical system interfaces which drives a reassessment of aircraft level hazards.	Example clarified to differentiate from Example 1. Note added to explain the change in assumptions.

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
19	An avionics upgrade that changes the method of input from the flightcrew, which was not contemplated during the original certification (e.g., novel change to implement voice activated controls).	No	No	Yes	A change that includes touchscreen technology typically does not invalidate the assumptions used for certification. A change that incorporates voice activated controls or other novel human-machine interface would likely invalidate the assumptions used for certification. Novel method of input which affects system interfaces and requires assessment of new aircraft level hazards and human-machine interface.	Added the example in the description and removed it from the notes. Note updated to explain the change to the assumptions.
20	Change of primary structure from metallic to composite.	No	Yes	Yes	Composite construction adds new materials and material characteristics. Original certification assumptions based on metallic structure.	New
21	Change from a piloted helicopter to an optionally piloted helicopter.	No	No	Yes	Novel method of input and concept of operation (from manned to unmanned operation) which affects system interfaces, aircraft functionality and requires assessment of new aircraft level hazards.	New

Example	Description of Change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
22	Increase of maximum take-off weight by approximately 10% or greater.	No	No	Yes	Requires reassessment of the operating envelope and aircraft behavior.	New
23	Increase of engine or transmission take-off power ratings by approximately 10% or greater.	No	No	Yes	The original performance is beyond what can be reasonably extrapolated. Could include changes to the transmission lubrication system.	New
24	Initial ditching certification.	No	No	Yes	Affects environmental factors at the product level which requires assessment of additional environmental hazards.	New
25	Change of primary structure to additively manufactured.	No	Yes	Yes	Principles of construction are changed due to new material or technology.	New
26	Change of type of engine (e.g., piston to turbine, turbine to hybrid).	Yes	No	Yes	Changes the general configuration and makes the product distinguishable from its predecessor. Changes system interfaces which require a reassessment of aircraft level hazards and engine control system failures.	New

Examples - Part 27 and 29: Not Significant

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
1	Emergency floats.	No	No	No	Must comply with the specific applicable requirements for emergency floats. This installation, in itself, does not change the rotorcraft configuration, overall performance, or operational capability. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, flight over water, or operations in snow conditions) are not by themselves so different that the original baseline certification assumptions are no longer valid at the type certificated product level.	Minor change to comments recommended.
2	FLIR, surveillance camera, loud speaker, searchlight installation, etc.	No	No	No	Additional flight or structural evaluation may be necessary but the change does not alter the basic rotorcraft certification. Addition of external mission equipment is not a product level change.	Example revised to add other mission equipment and note updated to explain that it is not a product level change.
3	Helicopter terrain awareness warning system (HTAWS) for operational credit.	No	No	No	Certificated under rotorcraft HTAWS AC guidance material and FAA TSO-6194. Does not alter the basic rotorcraft configuration and therefore is not a product level change.	Note does not need to identify the specific MoC and TSO. Note updated to confirm this is not a product level change.

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
4	Health usage monitoring system (HUMS) for maintenance credit.	No	No	No	Certificated under rotorcraft HUMS AG guidance material. Does not alter the basic rotorcraft configuration and therefore is not a product level change.	Does not need to identify the MoC. EASA for example has a CS for VHM. Note updated to confirm this is not a product level change.
5	Expanded limitations with minimal or no design changes, following further tests/justifications or different mix of limitations (e.g., CG limits, oil temperatures, altitude, minimum/maximum weight/altitude/temperature (WAT) limits, minimum/ maximum external temperatures, speed, engine ratings, snow, etc.).	No	No	No	Although testing and analysis may be required, changes to operating or performance envelopes do not require new verification methods and do not invalidate the original certification assumptions.	Example modified to reflect performance/ envelope changes. Weight moved to a separate example. Note revised to relate to the example.
6	Change from a single channel FADEC to a dual channel FADEC.	No	No	No	Change does not change the overall product configuration or the original certification assumptions.	The "No"s were missing.

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
7	Installation of a new or alternate engine of the same propulsion type (e.g., piston to piston or turbine to turbine) with an increase in power rating of less than 10%.; equivalent to the former one, leaving aircraft installation and limitations substantially unchanged.	No	No	No	Refer to AC 27-1 or AC 29-2 for guidance. Does not alter the basic rotorcraft configuration, provided there is no additional capacity embedded in the new design. Change of an engine from one manufacturer to another would not typically distinguish one product from another. Hazards need to be reassessed but are relatively unchanged as long as the engine technology is unchanged.	Example revised reflect engine technology and to add a threshold for the change in power (similar to what has traditionally been accepted as “Not-significant” and in the Part 25 examples). Note updated to explain the Not-Significant decision.
8	Windscreen installation.	No	No	No	Does not alter the basic rotorcraft configuration and therefore is not a product level change.	Note updated.
9	Snow skis, “Bear Paws.”	No	No	No	Must comply with specific requirements associated with the change. an operating envelope (such as operating altitude and temperature) and Expansions of the mission profile, such as landing in snow, are not so different that the original certification assumptions are no longer valid at the type certificated product level.	Note made more specific to the change.

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
10	External cargo hook or hoist for non-HEC.	No	No	No	Must comply with the specific applicable requirements for external loads. This installation, in itself, does not change the rotorcraft configuration, overall performance, or operational capability. an operating envelope (such as operating altitude and temperature) and Expanding a mission profile to external load operations excluding HEC is not by itself so different that the original certification assumptions are no longer valid at the type certificated product level.	Example updated to reflect a non-HEC approval and note updated to better reflect the example.
11	IFR upgrades involving installation of upgraded components to replace existing components.	No	No	No	Upgrading equipment on an already IFR certified aircraft does not distinguish the changed product from its predecessor and does not introduce new aircraft level hazards.	Note updated to explain why the change is not a product level change.
12	A non-highly integrated avionics change from federated electro-mechanical displays to federated electronic displays.	No	No	No	Changing from one type of federated system to another federated system does not introduce new hazards and therefore does not invalidate the original certification assumptions.	Example updated to differentiate the change from a Significant change. Note updated to explain why the change is not a product level change.

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
13	An avionics (non-flightdeck) change replacing an integrated avionics system with another integrated avionics system.	No	No	No	Although the hazards need to be reassessed, they are relatively unchanged, therefore the assumptions used to certify a highly integrated avionics system should be are the same for another highly integrated avionics system.	Clarified this covers non-flightdeck changes. Note updated to explain why the change is not a product level change.
14	Flightdeck replacement of highly integrated and combined electronic display systems with other highly integrated and combined electronic display systems.	No	No	No	Although the hazards need to be reassessed they are relatively unchanged, therefore the assumptions used to certify a highly integrated avionics system should be the same for another highly integrated avionics system. The change will be not significant if the architecture concepts, design philosophies, human-machine interface do not introduce new verification methodologies.	Note updated to expand on the assumptions for certification.
15	Flightdeck replacement or upgrade of avionics systems in a VFR, non-appendix "B" (HFR) or non-CAT "A" rotorcraft that can enhance safety or pilot awareness.	No	No	No	Introduction of equipment in a VFR rotorcraft that can improve pilot situation awareness and safety does not introduce new aircraft level hazards and is not a product level change	Example clarified to mean VFR and note expanded to explain why the criteria are not triggered.
16	Modifications to non-crashworthy fuel systems intended to improve its crashworthiness.	No	No	No	Does not alter the basic rotorcraft configuration and therefore is not a product level change.	Note added to explain the not significant decision

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
17	Changing the hydraulic system from one similar type of fluid to another, e.g., a fluid change from a highly flammable mineral oil based fluid (MIL-H-5606) to a less flammable synthetic hydrocarbon based fluid (MIL-PRF-87257)	No	No	No	Does not alter the basic rotorcraft configuration and therefore is not a product level change.	Note added to explain the not significant decision
18	Installation of a TSO C-127 dynamic seat in a helicopter with an existing certification basis prior to addition of § 29.562, <i>Emergency landing dynamic conditions</i> .	No	No	No	Does not alter the basic rotorcraft configuration and therefore is not a product level change	Example updated to reflect installation of a new type of seat and note updated.
19	New autopilot or stability augmentation system for VFR.	No	No	No	Does not alter the basic rotorcraft configuration and therefore is not a product level change. Assumptions are the same as for basic aircraft stability and control.	New
20	Integration of existing federated, independent electro- mechanical gages into an existing federated, highly-integrated electronic display system.	No	No	No	Since the baseline product already contains highly-integrated electronic displays the assumptions used for certification are not invalidated. The change will be not significant if the human-machine interface does not introduce new verification methodologies.	New

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
21	Increase of maximum take-off weight by less than 10%.	No	No	No	Although testing and analysis may be required, changes to increase the take-off weight do not require new verification methods and do not invalidate the original certification assumptions.	New
22	Change of non-primary structure from metallic to composite or additively manufactured.	No	No	No	Changing the materials of non-primary structure does not change the assumptions for certification.	New
23	Increase of transmission take-off power ratings by less than 10%.	No	No	No	Although testing and analysis may be required, changes to increase the take-off power rating do not require new verification methods and do not invalidate the original certification assumptions.	New
24	Increase of transmission power ratings within the existing take-off power ratings.	No	No	No	Although testing and analysis may be required, changes to increase miscellaneous power ratings do not require new verification methods and do not invalidate the original certification assumptions.	New

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
25	Emergency Medical Service (EMS) configuration.	No	No	No	Most EMS configurations will not be classified as significant. Modifications made for EMS are typically internal, and the general external configuration is normally not affected. If extensive changes to primary structure are required, then the change may become significant.	New. Added a not significant example for EMS. If the original design assumption was an aircraft that can be used for multi-purpose (as almost all helicopters are), then this is not significant by itself.
26	Installation of avionics communication and navigation systems.	No	No	No	Installation of communications and navigation systems and their antennae are not a product level change.	New
27	Avionics or flightdeck software updates.	No	No	No	Software changes generally do not introduce new aircraft level hazards therefore the certification assumptions are unchanged. The change will be not significant if the human-machine interface is not impacted and does not introduce new verification methodologies.	New
28	Change to main rotor or tail rotor chord or length with performance change less than 10%.	No	No	No	Although testing and analysis may be required, small changes to the main or tail rotor do not require new verification methods and do not invalidate the original certification assumptions.	New

Example	Description of change	Is there a change to the general configuration? § 21.101(b)(1)(i)	Is there a change to the principles of construction? § 21.101(b)(1)(i)	Have the assumptions used for certification been invalidated? § 21.101(b)(1)(ii)	Notes	ARC Comments
29	Functionality enhancement of an existing autopilot.	No	No	No	The change will be not significant if the human-machine interface does not introduce new verification methodologies. Special Conditions may be required for enhanced IMC modes.	New
30	Expanded Category A or Category B performance	No	No	No	Although testing and analysis may be required, changes to operating or performance envelopes do not require new verification methods and do not invalidate the original certification assumptions.	New
31	Installation of an emergency auto-land or recovery system	No	No	No	Assumes pilot incapacitation and is not used under normal operation.	New

Appendix J - ARC Member Voting Responses and Ballots

The ARC completed its deliberations, and electronic ballots were distributed to the 23 voting ARC members on June 22, 2026. Completed ballots are included in this appendix. The tally is as follows:

16 – Concur as Written

6 – Concur with Comment or Exception

0 – Non-Concur

1 – Ballot Not Submitted

Member Organization	ARC Voting	Vote
Aerospace Industries Association (AIA)	David Hyde	Concur with comment or exception
AIA of Canada	David Turnbull	Concur as written
Airbus	Jean-Philippe	Concur as written
Airbus Helicopters	Olivier	Concur with comment or exception
Aircraft Electronics Association (AEA)	Ric Peri	Concur with comment or exception
Archer	Eric Wright	Concur as written
ATR	Camille Bentz	Concur with comment or exception
Bell	Mike Deer	Concur as written
Boeing	Bernhard Muster	Concur with comment or exception
Bombardier	John Kotnjek	Concur with comment or exception
Cirrus Aircraft	Chris Mitchell	Concur as written
Dassault Aviation	Laurent Franzoni	Concur as written
Embraer	José Luiz Rocha	Concur as written
Erickson Inc.	Ilex Brandenberger	Concur as written
Garmin	Paul Mast	Concur as written
General Aviation Manufacturers Association (GAMA)	Kyle Martin	Concur as written
General Electric	Doug Beneteau	Concur as written
Gulfstream	Keith Candline	Concur as written
HondaJet	John Rock	Concur as written
Piper	Jeff Covington	Ballot not submitted
Pratt and Whitney	Keith Morgan	Concur as written
Textron Aviation	John Bouma	Concur as written
Rolls-Royce	Bruce Cook	Concur as written

1. Please enter your name. *

David Hyde

2. What organization are you representing? *

Aerospace Industries Association

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☐ I concur with the report as written.
- ☒ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

Many of the recommendations within the ARC are highly dependent on each other and concurrence is based on their mutual adoption.

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

David Hyde

1. Please enter your name. *

David Turnbull

2. What organization are you representing? *

AIAC

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

N/A

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

David Turnbull

1. Please enter your name. *

Jean-Philippe TARRES

2. What organization are you representing? *

AIRBUS

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

N/A

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Jean-Philippe TARRES

1. Please enter your name. *

Olivier Jeunehomme

2. What organization are you representing? *

Airbus Helicopters

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☐ I concur with the report as written.
- ☒ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

REC A18 & 19 achieved the necessary integration of first report REC 8 to 12 and that this additional charter would have deserve further convergence on the definition and calibration of the objective criteria listed in REC1. Additionally, the exceptions to Substantial classification and the link with Significant change requires an adaptation of the overall CPR flowchart.

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Olivier Jeunehomme

1. Please enter your name. *

Ric Peri

2. What organization are you representing? *

Aircraft Electronics Association

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☐ I concur with the report as written.
- ☒ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

While I concur with the fundamentals of the report, the final answer will be in how the FAA chooses to implement the final report. Under the proposed guidance the FAA may require additionally document from teh STC applicants: system architecture, human-machine interface, maintenance concept, operating characteristics, flight crew requirements, Since an avionics STC touches every one of these criteria, even if every answer is "no effect," the FAA may require additional paperwork, thereby increasing the adminisitrative burden on the applicant..

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Richard Peri

1. Please enter your name. *

Eric Wright

2. What organization are you representing? *

Archer Aviation Inc.

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

Concurring as written

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Eric Wright

1. Please enter your name. *

Camille Bentz

2. What organization are you representing? *

ATR

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☐ I concur with the report as written.
- ☒ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

I concur with the report as written. Please ensure that the Phase 2 recommendations take precedence over the corresponding recommendations from Phase 1, wherever applicable.

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Camille Bentz

1. Please enter your name. *

Michael Deer

2. What organization are you representing? *

Bell

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

Concur

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Michael Deer

1. Please enter your name. *

Bernhard U. Muster

2. What organization are you representing? *

The Boeing Company

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☐ I concur with the report as written.
- ☒ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

Comment - This ballot is cast on the CPR ARC Phase 2 report final addendum dated July 2, 2026. Many of the recommendations within the ARC are highly dependent on each other and concurrence is based on their mutual adoption.

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Bernhard U. Muster

1. Please enter your name. *

John Kotnjek

2. What organization are you representing? *

Bombardier

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☐ I concur with the report as written.
- ☒ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

The ballot is filled earlier as I will be on vacation. This said, it is noted that at this time the report is acceptable, but Bombardier (Fidelio) are reviewing last minute comments by the CPR ARC team that may require to be addressed

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

John Kotnjek

1. Please enter your name. *

Christopher Mitchell

2. What organization are you representing? *

Cirrus

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

No comments

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Christopher Mitchell

1. Please enter your name. *

FRANZONI

2. What organization are you representing? *

DASSAULT-AVIATION

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

Final phase 2 report is fully satisfactory. Final report's recommendations are of paramount importance; therefore their adequacy with the initial report must be carefully evaluated. In addition, AC 21.101 flow chart should be adapted in order to reflect that a change to TC is substantial if it is significant and requires a substantially complete investigation of compliance

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

FRANZONI LAURENT

1. Please enter your name. *

Jose Luiz Rocha Belderrain

2. What organization are you representing? *

Embraer

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

No comments

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Jose Luiz Rocha Belderrain

1. Please enter your name. *

Ilex Brandenberger

2. What organization are you representing? *

Erickson Incorporated

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

Erickson would like to thank the FAA for the opportunity to participate in this effort and the other industry participants for all of the hard work and thought that went into creating this document.

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Ilex Brandenberger

1. Please enter your name. *

Paul Mast

2. What organization are you representing? *

Garmin

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

NA

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Paul Mast

1. Please enter your name. *

Kyle Martin

2. What organization are you representing? *

General Aviation Manufacturers Association (GAMA)

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

N/A

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Kyle Martin

1. Please enter your name. *

Doug Beneteau

2. What organization are you representing? *

GE Aerospace

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

no comments or exceptions

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Douglas P Beneteau

1. Please enter your name. *

Keith Candline

2. What organization are you representing? *

Gulfstream Aerospace Corporation

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

N/A

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Keith Candline

1. Please enter your name. *

John R Rock

2. What organization are you representing? *

Honda Aircraft Corporation

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

No additional comments

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

John R. Rock

1. Please enter your name. *

Keith R Morgan

2. What organization are you representing? *

Pratt & Whitney/RTX

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

Concur without comment

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

Keith R Morgan

1. Please enter your name. *

John Bouma

2. What organization are you representing? *

Textron Aviation

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

None beyond what has been coordinated and agreed to already.

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

John T Bouma

1. Please enter your name. *

J. Brue Cook

2. What organization are you representing? *

Rolls-Royce

3. Please vote on the final report here. Do you concur, concur with comment or exception, or non-concur? *

- ☒ I concur with the report as written.
- ☐ I concur with comment or exception. (Must provide comments in question 4)
- ☐ I do not concur with the report. (Must provide dissent in writing on organization letterhead)

4. If concurring with comment or exception, please provide comment or exception in the text box below. You may submit a separate paper on company/organization letterhead to puja@reg-group.com if additional space is required (may not exceed 2 pages in length). *

I concur with the report as written.

5. As a voting member and full participant of the Changed Product Rule Aviation Rulemaking Committee, I hereby acknowledge that I have reviewed the Final Phase 2 Addendum and recommendations. My response is recorded on this ballot. Below is my virtual signature. (Please type your full name) *

James Bruce Cook