U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER 8110.48A

National Policy

07/21/2017

SUBJ: How to Establish the Certification Basis for Changed Aeronautical Products

This order defines the procedures to establish the certification basis for type design changes to aeronautical products in accordance with Title 14 of the Code of Federal Regulations (14 CFR) 21.101. It also contains guidance for identifying when to apply for a new type certificate (TC) under 14 CFR 21.19.

Susan J. M. Cabler
Manager, Design, Manufacturing & Airworthiness Division
Aircraft Certification Service

Table of Contents

Chapter 1. Introduction

1-1. Purpose.

a. This order defines the procedures to establish the certification basis for changed aeronautical products pursuant to 14 CFR 21.101, *Designation of applicable regulations*. This order also defines if it will be necessary to apply for a new TC under § 21.19, *Changes requiring a new type certificate*.

b. This order applies to major type design changes for aeronautical products certified pursuant to 14 CFR parts 21, 23, 25, 27, 29, 31, 33, and 35. References to "design change" include the design change and areas affected by the design change pursuant to § 21.101. For other acronyms, definitions, and terminology referred to in this order, see Appendix A.

c. This order also applies to design changes made to aircraft certificated pursuant to §§ 21.17(b), 21.19, 21.24, 21.25, 21.27, and 21.29.

d. Do not use this order to determine the applicable aircraft noise, fuel venting, and exhaust emission requirements for changed products. Information for approval of noise and emissions can be found in 14 CFR parts 34 and 36.

e. The general certification procedures for products (aircraft, aircraft engines, and propellers) and articles are defined in 14 CFR part 21. Subpart B, *Type Certificates*, and Subpart D, *Changes to Type Certificates*, of 14 CFR part 21 specify procedural regulations and references to the applicable airworthiness standards for type certification of new products and changes in product type design. The procedures found in § 21.101, which are defined in this order, describe the process for establishing the certification basis for an amended TC, supplemental type certificate (STC), and amended STC, detailing the requirements (evaluations, classifications, and decisions) made throughout the process.

f. For the purpose of this document, all references to design changes and areas affected by the design changes are considered amendments made to an aeronautical product's type design.

1-2. Audience. This order applies to Federal Aviation Administration (FAA) Headquarters, Directorates, Aircraft Certification Offices (ACOs), delegated organizations, and designees engaged in certification of design changes to aeronautical products.

1-3. Where to Find this Order. FAA personnel can find this order on the MyFAA Employee website at https://employees.faa.gov/tools_resources/orders_notices. This order is also available to the public on the FAA website at http://www.faa.gov/regulations_policies/orders_notices/ and on the Regulatory and Guidance Library website at http://rgl.faa.gov.

1-4. Related Publications.

a. The companion documents for this order are—

- Advisory Circular (AC) 21.101-1, *Establishing the Certification Basis of Changed Aeronautical Products*;
- Order 8100.15, *Organization Designation Authorization Procedures*;
- Order 8110.4, *Type Certification*;
- Order 8110.112, *Standardized Procedures for Usage of Issue Papers and Development of Equivalent Levels of Safety Memorandums*;
- Order 8110.115, *Certification Project Initiation and Certification Project Notification*; and
- Order 8110.56, *Restricted Category Type Certification*.

b. Use AC 21.101-1, along with this order, when certifying major type design changes to all aeronautical products. The AC was harmonized with Agência Nacional de Aviação Civil (ANAC), European Aviation Safety Agency (EASA), and Transport Canada Civil Aviation (TCCA) to ensure harmonized application of the § 21.101 requirements. The AC contains step-by-step procedures to determine the level of significance and appropriate certification basis for product design changes. It also contains examples of significant and not significant design changes, which the Authorities have already predetermined the level of significance.

1-5. Cancellation. This document cancels FAA Order 8110.48, dated April 25, 2003.

Chapter 2. Overview of §§ 21.19 and 21.101

2-1. Section 21.19.

a. Section 21.19 requires an applicant to apply for a new TC for a changed product if the FAA finds that the change in design, power, thrust, or weight is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.

b. A change to a product that meets the requirements of § 21.19 is a "substantial design change." Essentially, a substantial design change is an alteration to a product that is so extensive that the design models, methodologies, and approaches used to demonstrate a previous compliance finding cannot be used. The FAA weighs the magnitude of the proposed product design change against the degree of investigation needed to establish compliance with the applicable regulations. For examples of type design changes that require a new TC, see appendix A of AC 21.101-1B.

c. If the FAA determines through § 21.19 that a proposed design change does not require a new TC, follow § 21.101 for the applicable requirements to develop the certification basis. For guidance, see AC 21.101-1B.

2-2. Section 21.101.

a. Section 21.101(a). Section 21.101(a) requires a change to a TC and the area affected by the change to comply with the latest requirements, unless the change meets the criteria for the exceptions identified in § 21.101(b) and (c). The intent of § 21.101 is to enhance safety by incorporating the latest requirements into the type certification basis for the changed product, to the greatest extent practicable.

b. Section 21.101(b).

(1) Section 21.101(b) pertains to when an applicant may show that a changed product complies with an earlier amendment of a regulation, provided that the earlier amendment is adequate and meets the criteria in § 21.101(b)(1), (2), or (3). When design changes involve features or characteristics that are considered novel and unusual, and the proposed airworthiness standards do not contain adequate or appropriate safety standards for this feature, later amendments and/or special conditions will be applied. In addition, pursuant to § 21.21(b)(2), if there is a feature or characteristic that would make the changed product unsafe for the use for which certification is requested, then the FAA will impose additional requirements.

(2) The applicant may comply with the earlier requirements consistent with § 21.101(b), where—

(a) A change is not significant (see § 21.101(b)(1));

(b) An area, system, component, equipment, or appliance is not affected by the change (see § 21.101(b)(2));

(c) Compliance with a later amendment for a significant change does not contribute materially to the level of safety (see § 21.101(b)(3)); or

(d) Compliance with a later amendment would be impractical (see § 21.101(b)(3)).

Note: Earlier amendments may not precede the amendment level of the baseline product's certification basis. The certification basis must also include any applicable requirement found in special retroactive requirements §§ 23.2, 25.2, 27.2, and 29.2, or any applicable requirements of 14 CFR part 26.

(3) Section 21.101(b)(1)(i) and (ii) contain the criteria for automatically determining that a design change is significant. A design change is significant if it meets one of the following criteria:

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

(b) The assumptions used for the original certification of the product do not remain valid.

c. Section 21.101(c). Section 21.101(c) provides an exception from the requirements of § 21.101(a) for a change to certain aircraft with less than the specified maximum weight. If application is made for a type design change to an aircraft (other than rotorcraft) of 6,000 pounds or less maximum weight, then the applicant may show that the changed product complies with the regulations incorporated by reference in the type certificate. The applicant may also elect to comply with the later regulations. For excepted class aircraft with a design change "significant in an area," the FAA may require the applicant to comply with the later regulations and any regulations that the FAA finds directly related. See chapter 4 of AC 21.101-1B for additional guidance on this provision.

d. Section 21.101(d). Section 21.101(d) provides for the use of special conditions, under § 21.16, when the proposed certification basis and any later regulations do not provide adequate standards to the proposed change because of a novel or unusual design feature.

e. Section 21.101(e). Section 21.101(e) prescribes the effective period that an application will remain valid for a proposed design change.

f. Section 21.101(f). Section 21.101(f) pertains to aircraft certificated in certain categories and special classes (e.g., gliders, airships, and other nonconventional aircraft, and balloons certificated under 14 CFR part 31), including the engines and propellers installed on them, under the airworthiness requirements of §§ 21.17(b), 21.24, 21.25, and 21.27.

g. Section 21.101(g). Section 21.101(g) pertains to regulatory compliance of transport category airplanes with the applicable provisions of part 26 and/or corresponding later amendments to part 25. For transport category airplanes, the applicant must comply with each applicable provision of part 26 for the change, unless the applicant has elected or is required to comply with a corresponding amendment to part 25 that was issued on or after the date of the applicable part 26 provisions.

Chapter 3. Roles and Responsibilities

3-1. Overview.

a. This chapter identifies the roles and responsibilities for the Aircraft Certification Service and delegated organizations when certifying product design changes.

b. The Design, Manufacturing and Airworthiness Division, AIR-100, recommends that each directorate and ACO assign a focal point to support the application of § 21.101, also referred to as the Changed Product Rule (CPR), and the guidance contained in this document. AIR-100 will support the directorates regarding issues pertaining to the application of § 21.101 and will make the final rule interpretation if an issue cannot be resolved at the ACO/directorate level.

c. Each directorate and ACO will accomplish the following as applicable:

(1) Except for Organization Designation Authorization (ODA) projects as described in paragraph (3) below, the ACO project manager reviews the project information and makes a preliminary finding as to whether the design change is significant or not significant in accordance with § 21.101 and AC 21.101-1B.

(2) The ACO project manager uses the Certification Project Notification (CPN) to notify the directorate standards staff if the design change is significant or not significant. This decision is documented on the CPN as prescribed in Order 8110.115, *Certification Project Initiation and Certification Project Notification*. If the applicant provides an optional decision record, the ACO project manager may find it helpful to provide a copy of this record when submitting the CPN to the directorate. Note that this optional decision record is used to make a predetermination of the level of significance. An example is provided in Appendix B and follows the procedural requirements per the flowchart in figure 3-1 of AC 21.101-1B.

(3) Normally, the accountable directorate reviews the information contained in the CPN and responds back with the final determination as to whether the design change is significant or not significant. The directorate may request a copy of the applicant's optional decision record, if one has been provided to the ACO. However, the directorate does not make a final determination of significant or non-significant for ODA certification projects that do not require a program notification letter (PNL) in accordance with Order 8100.15, *Organization Designation Authorization Procedures*. These no-PNL projects are pre-determined as not significant when properly authorized and managed in accordance with the ODA procedures manual. Refer to Order 8100.15, on CPN requirements for no-PNL projects.

(a) If the design change is determined to be significant, the certification basis is typically established through the G-1 issue paper process. With FAA agreement, the G-1 issue paper would document the applicant's proposal and decisions made, including whether proposed exceptions for earlier requirements are valid. Changed and affected areas, along with the associated regulations and amendment levels, should be clearly documented in the G-1 issue paper. An example tool is provided in appendix H of AC 21.101-1B. If the applicant has proposed to meet the latest requirements on the date of application, a G-1 issue paper is not

required. In this case, a note may be placed in the applicant's certification plan or the FAA's project folder that a G-1 issue paper will be required to establish the certification basis if the applicant proposes exceptions later in the program.

(b) For not significant changes, a G-1 issue paper may be required if the certification basis is determined to be inadequate and requires changes more complex than the addition of special conditions under § 21.101(d). When needed, the G-1 issue paper defines which later regulatory requirements and special conditions are required, thereby establishing the certification basis. Simple changes to the certification basis may be documented in a certification plan or other documentation as agreed by the accountable directorate.

(4) The ACO project manager, in coordination with the accountable directorate, establishes the certification basis for amended TCs or STCs. See Appendix C of this order for examples of documenting a certification basis for a design change. See FAA Form 8110-2, *Supplemental Type Certificate*, which includes instructions for preparing the form, in appendix 2 of Order 8110.4C.

(5) The certifying office or delegated organization documents the certification basis on the type certificate data sheet (TCDS) or STC for all major type design changes made to aeronautical products, with one exception: If the existing certification basis is used for not significant design changes under an amended TC, it does not need to be documented on the TCDS. Appendix C of this order includes examples of how to document a certification basis. See chapter 5, paragraph 5-10 of this order and AC 21.101-1B for additional information pertaining to documentation.

(6) For validation programs, the ACO or Oversight Office project manager, in coordination with the accountable directorate, establish the certification basis for design changes in accordance with the appropriate Bilateral Aviation Safety Agreement implementation procedures for airworthiness. The validating authority will use the certifying authority's date of application to establish the certification basis for design changes.

3-2. Reserved.

Chapter 4. Application of § 21.101 for Type Design Changes

4-1. Determining the Applicability of § 21.101.

a. A "change to a type certificate" as stated in § 21.101 refers to changes in the type design of the aeronautical product, which includes design changes to STCs. Due to their extremely limited extent of change, minor type design changes, as defined in § 21.93, are automatically considered not significant. Only major type design changes have sufficient extent of change to warrant review under § 21.101. The existing type certificate basis may be considered adequate for approvals under § 21.95.

b. Section 21.101 applies to major type design changes for aeronautical products certificated under parts 21, 23, 25, 27, 29, 31, 33, and 35. Section 21.101 also applies to aircraft certificated under §§ 21.17(b), 21.19, 21.24, 21.25, 21.27, and 21.29.

c. The FAA evaluates design changes on engines or propellers independent of the aircraft. However, there must be an assessment of an engine or propeller design change when installed at the aircraft level. A significant design change at the engine or propeller level may not be significant at the aircraft level or vice versa, and it may require dual certification (one for the engine or propeller, and the other for the aircraft).

d. The airworthiness requirements in effect on the date of application are in parts 21, 23, 25, 26, 27, 29, 31, 33, and 35. Consequently, when electing to comply with later requirements, the predecessor regulations (i.e., Civil Air Regulations (CARs)) are not considered in effect on the date of application. Predecessor regulations are not recognized under § 21.101(a), but may be allowed under § 21.101(b), (c), and (f).When choosing the amendment level of a regulation, all related regulations associated with that amendment level would have to be included.

e. Service bulletins may constitute changes in type design. Therefore, all service bulletins consisting of major design changes must be evaluated for the level of significance and cumulative effects pursuant to § 21.101.

f. A previously approved modification or configuration on one model does not constitute approval on another.

4-2. Product Level. A "product level" change is a change or combination of changes that makes the product distinct from other models of the product (e.g., range, payload, speed, design principles). A product level change is defined at the aircraft, aircraft engine, or propeller level of change. The concept of product level change is directly related to the determination of significance. In order to assess whether a change is significant, consider the design change effect on the overall aeronautical product (aircraft, aircraft engine, or propeller). See AC 21.101-1B for examples of design changes that the FAA has already determined as significant.

4-3. Significant Design Change.

a. Section 21.101(b)(1) defines a design change as significant where at least one of the criteria applies:

- Changes where the general configuration or principles of construction are not retained.
- The assumption used for the certification of the product to be changed does not remain valid.

b. If the design change is classified as significant, the change and area affected by the change must comply with the amendments in effect on the date of application for the design change. The applicant may propose exceptions in § 21.101(b)(2) and (3) to show compliance with earlier amendments for areas affected by the design change for which compliance with the latest regulatory standards would not contribute materially to the level of safety or would be impractical. The applicant must provide acceptable justification to support the application of the earlier amendments. This evaluation is done on a regulation-by-regulation basis. For areas not affected by the design change, the applicant may use the existing certification basis.

c. For each design change, it is important that the effects of the change on other systems, components, equipment, or appliances of the product are properly identified and assessed. The intent is to encompass all aspects where there is a need for re-evaluation—that is, where the substantiation presented for the product being changed is incomplete or invalid due to the change or its effect on the product, it should be reviewed, updated, or rewritten. For many years, the FAA has required applicants to apply this procedure; this practice is unchanged under the procedures of § 21.101.

d. When evaluating a design change as significant, consider all related, current, cumulative, and previously approved design changes at the product level. The cumulative effects are those incorporated since the last time the certification basis was upgraded in the area being changed from that of the original type design. Previously approved design changes can consist of, but are not limited to, STCs, service bulletins, letters of design approvals, and field approvals. Applicants may have included these previous design changes through earlier changes in the TC. The collective result may be a product considerably different from the latest updated certification basis for the product or model. One characteristic of § 21.101 is to eliminate the case where the design continues to evolve without a corresponding incorporation of later airworthiness standards.

e. Typically, a major design change to a single area, system, or component will not result in a product level change. However, there are exceptions such as when a system installation affects the aircraft's operation, performance, or capability. For additional details and examples of significant and not significant design changes and affected areas, see AC 21.101-1B.

f. Secondary Changes. A secondary change is a change in physical and/or functional aspects that is part of but consequential to a significant physical design change, whose only purpose is to restore, and not add or increase, existing functionality or capacity. A secondary change of a significant design change is not required to comply with the latest requirements

because it is considered "not contributing materially to the level of safety" and, therefore, eligible for an exception under § 21.101. Determining whether a change meets the description for a secondary change, and thus eligible for an exception, should be straightforward. Hence, the substantiation or justification need only be minimal. If this determination is not straightforward, then the proposed change is not a secondary change. In some cases, however, the change that restores functionality may in fact contribute materially to the level of safety by meeting a later amendment. If this is the case, it is not considered a secondary change. For additional details and application of secondary changes, see AC 21.101-1B.

4-4. Certification Basis for Design Changes that are Not Significant.

a. When the design change is determined to be not significant, § 21.101 allows continued compliance with the existing certification basis except where, under § 21.21:

(1) The airworthiness standards do not provide an appropriate level of safety for the intended change. For example, a certain advanced avionics system is considered not significant, and the existing aircraft certification basis does not contain a standard for lightning and high intensity radiated fields (HIRF) protection. Compliance with the lightning and HIRF protection requirements would then be appropriate for this not significant design change. See AC 21.101-1B for additional details.

(2) The change and the areas affected by the change result in any unsafe design feature or characteristic for the intended use. See § 21.21(b)(2) and AC 21.101-1B for more details.

(3) Applicants may elect to comply with later amendments for changes in type design, but should consult the FAA to ensure that they also comply with all other directly related regulations.

b. The FAA determines the final certification basis for product design changes. For not significant changes, where a G-1 issue paper is not required, this determination is made by the accountable directorate in response to the CPN. The certification basis 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.

4-5. Certification Basis for Excepted Aircraft, § 21.101(c).

a. Section 21.101(c) provides an exception to § 21.101(a) compliance with the latest requirements for aircraft (other than rotorcraft) of 6,000 pounds or less maximum weight, or to a non-turbine rotorcraft of 3,000 pounds or less maximum weight. In these cases, the applicant may elect to comply with the existing certification basis. However, the applicant has the option of applying later appropriate regulations. Special class aircraft, including gliders, airships, and primary category, are addressed in § 21.101(f), not in § 21.101(c).

b. If the FAA finds that the design change is "significant in an area," the FAA may require the applicant to comply with later regulations and/or special conditions. Starting with the existing certification basis, the FAA will progress through each later regulation to determine the amendment appropriate for the design change. However, if an applicant proposes, and the FAA finds, that complying with the later amendment or regulation would not contribute materially to

the level of safety of the changed product or would be impractical, then the FAA may allow the applicant to comply with an earlier amendment appropriate for the proposed design change. The amendment may not be earlier than the existing certification basis.

(1) For a not significant design change, the applicant may elect to comply with later regulatory amendments to the existing certification basis. However, the applicant may be required to comply with any other regulations directly related or relevant. In some instances, a regulation may have been amended to become less stringent, while a related regulation may have become more stringent. In these situations, the applicant must also comply with the related, more stringent regulations.

(2) For a not significant design change that lacks an adequate certification basis: for novel or unusual design features, the FAA will designate the applicable special condition(s) appropriate for the design change pursuant to § 21.16.

(3) The exception for products under § 21.101(c) applies to the aircraft only. Design changes to engines and propellers installed on these excepted aircraft are assessed as separate type certificated products under § 21.101(a) and (b).

4-6. Special Conditions for Novel or Unusual Design Features, § 21.101(d).

a. Pursuant to § 21.101(d), the FAA may add special conditions to the certification basis if it finds that the regulations in effect on the date of application for the design change do not provide adequate standards because of novel or unusual design features. This section applies to both significant and not significant design changes. The level of safety intended by the special condition must be commensurate with the certification basis of the proposed design change. See § 21.16.

b. Special conditions address novel and unusual design features that were not envisioned in an existing certification basis and are not addressed by later regulatory requirements. The application of special conditions to a design change is not, in itself, a reason to classify it as either a substantial or significant change. When the design change is "not significant" or "significant" with earlier requirements allowed through exceptions, the level of safety intended by the special conditions must be consistent with the agreed certification basis for that area of design change.

4-7. Effective Period for an Application to Change a Type Certificate, § 21.101(e).

a. According to § 21.101(e), an application for or a change to a TC for transport category aircraft is effective for five years from the date of application, and an application for a design change to any other type certificate is effective for three years. If the change has not been approved, or if it is clear that the change will not be approved, within the application time limit, the applicant must file for either a new application or an extension to the original application. If the applicant does not file for an extension or new application by the end of the time period, the applicant must file for a new application and re-establish a new certification basis. The intent of this requirement is to ensure that the certification basis for the changed product is as current as practicable. This paragraph is applicable to amended TCs, STCs, and amended STCs.

b. When filing an extension, the applicant must choose a completion date, then apply the applicable effectivity from § 21.101(e) to determine an effective application date. The effective application date must not precede the original date of application for the proposed design change and must not be later than the filing date for an extension.

c. If the applicant requests an extension to the application date, and the product change is significant, a new certification basis is required. The new certification basis requires the additional latest regulations effective through the new application extension date. However, the applicant may use earlier regulations by documenting justification that the latest regulations for the change would not contribute materially to the level of safety or would be impractical.

d. If the product change is not significant, the applicant may continue to use the existing certification basis for product certification. However, if the applicant makes additional design changes to the product, and the FAA finds the existing certification basis for the change inadequate, the new certification basis will require later appropriate standards.

4-8. Other Category Aircraft, § 21.101(f). For aircraft type certificated under §§ 21.17(b), 21.24, 21.25, and 21.27, the certification basis for the changed product consists of the amendment levels of the applicable regulations that the FAA finds appropriate for the change in effect on the date of application for the change. When selecting a certification basis for a change, you can propose compliance to an earlier amendment using the provisions of § 21.101(b). The exceptions in § 21.101(c) do not apply to categories of products defined in § 21.101(f).

a. Special Classes Aircraft. For special classes of aircraft (e.g., gliders, airships, etc.) including any installed engines and propellers certificated pursuant to § 21.17(b), the applicable requirements are portions of those other airworthiness requirements in parts 23, 25, 27, 29, 31, 33, and 35 that the FAA finds appropriate for the aircraft and applicable to the specific type design, or such airworthiness criteria that the FAA finds an equivalent level of safety (ELOS) to those parts.

b. Primary Category Aircraft. For primary category aircraft certificated under § 21.24, the applicable airworthiness requirements are in parts 23, 27, 31, 33, and 35, or such other requirements the FAA finds appropriate. These requirements must be applicable to the specific design and intended use of the aircraft and provide a level of safety acceptable to the FAA.

c. Restricted Category Aircraft.

(1) For aircraft certificated in the restricted category under § 21.25(a)(1), the application of the latest regulations typically would be considered not to contribute materially to the level of safety or be practical for its intended use. However, if the airworthiness regulations applicable to the aircraft at the time the TC was issued do not provide an adequate level of safety for the design change, the application of later regulations will be required.

(2) Features of the changed product that are “novel” or “unusual” to the original certificated restricted category product may be assessed against a later requirement that addresses the feature. In this case, the applicable airworthiness requirements in effect at the time of the existing restricted category TC may be viewed as a starting point, with subsequent amendments

being examined, if necessary, to arrive at a requirement that provides an appropriate level of safety.

(3) For the installation of turbo-propeller engines instead of reciprocating engines (either in a restricted category aircraft that was originally certificated based on satisfactory military service experience or in a restricted category aircraft for which the original certification basis did not contain regulations for turbine engine installations), later amendments will be used to provide an appropriate level of safety for its intended operation. In addition, any change to the aircraft must be shown to be "safe for its intended use" as required by § 21.25. See Order 8110.56B, *Restricted Category Type Certification*, for additional details.

(4) If the design change includes a new special purpose, it may require a re-evaluation of the regulations for certification. See Order 8110.56B, Chapter 5.

d. Restricted Military Aircraft. Aircraft type certificated in the restricted category under § 21.25(a)(2) are accepted on the basis of the U.S. military use and other eligibility factors, instead of showing compliance with airworthiness standards in 14 CFR Chapter 1. (See Order 8110.56B, Chapter 4, for additional details.) Many of these aircraft were not certificated to airworthiness standards; therefore, any modifications made to the military configuration must meet an equivalent civil certification basis derived from the airworthiness regulations contained in 14 CFR. This baseline certification basis is the airworthiness regulations (i.e., parts 23, 25, 27, 29, 33, or 35, or CARs, as appropriate) that were in effect on the date that the first military model was accepted for operational use by the U.S. Armed Forces. Section 21.101(f) requires the application of the latest amendments to significant changes to these products. However, since the latest amendments may not be appropriate for the aircraft's intended use, earlier regulations are acceptable. They cannot predate the equivalent certification basis. If these regulations do not include airworthiness standards applicable to the change, later regulations appropriate to the product category will be applied. In addition, any design change to the aircraft must be shown to be "safe for its intended use" as required by § 21.25. See Order 8110.56B for additional details.

e. Surplus Military Aircraft. Aircraft type certificated under § 21.27 are entitled to a TC in the normal, utility, acrobatic, commuter, or transport category. These aircraft were designed and constructed in the United States, accepted for operational use, and declared surplus by the U.S. Armed Forces. These aircraft may be counterparts, and are considered equivalent, to the previously civil certificated aircraft. Product changes or modifications to these aircraft are certificated in the same manner as their civil counterparts.

f. Limited Category Aircraft. Limited category aircraft are surplus military aircraft, mostly from World War II, that were type certificated under CAR part 9 for use other than air transport. These aircraft are not permitted to carry persons or property for hire and were accepted based on their previous military qualifications. A change to aircraft not supported by the military service history must comply with appropriate airworthiness standards. The level of safety associated with earlier standards may be acceptable for limited category aircraft.

4-9. Clarification of § 21.101(g), Part 26 Requirements.

a. Part 26 establishes requirements for support of continued airworthiness of and safety for transport category airplanes. The applicant must show compliance with each applicable provision of part 26, unless the applicant has elected or was required to comply with a corresponding amendment to part 25 that was issued on or after the date of the applicable part 26 provision. Section 21.101(g) does not allow an applicant to use an exception under § 21.101(b) for relief from complying with the applicable provisions of part 26.

b. The language in § 21.101(g) also recognizes that future part 25 amendments will be issued after the requirements in part 26 are established. Consequently, an applicant may be required to comply with a later part 25 amendment. Section 21.101(g) does not contain exception provisions for reverting to earlier part 26 requirements. However, under § 21.101(b) instead of complying with a later part 25 requirement, an applicant may be allowed to comply with an earlier part 25 requirement if justification is provided.

Chapter 5. Other Considerations

5-1. Expanding the Effectivity or Eligibility of an Existing TC or STC to Include Additional Serial Numbers of the Same Model. Most TCs and STCs have no restrictions on the effectivity or eligibility for the FAA-approved design change beyond the make/model combination indicated on the certificate. However, an FAA-approved design configuration may be limited in effectivity or eligibility—typically by a range of serial numbers (S/Ns) or some other identifier. If the applicant determines at a later (post-approval) date that additional effectivity or eligibility is desired, the applicant and FAA will need to consider the following:

a. The added aircraft may be sufficiently compatible with the prior FAA-approved design change that the newly proposed effectivity will not require further design changes to make it compatible. Otherwise, the applicant may need to include additional major design changes to accommodate the newly proposed effectivity.

b. If No Additional Major Design Changes are Necessary: In this case, compatibility with the prior FAA-approved design change is established, so the expansion of effectivity or eligibility is a simple administrative change to the TC or STC. The FAA will compare the certification basis of the prior FAA-approved design change with the certification basis of the added aircraft.

(1) If the added aircraft has a later amendment level in the area of the design change, the prior FAA-approved design change may require re-substantiation and new findings of compliance to establish compliance with the later amendment level.

(2) If the added aircraft does not have a later amendment level in the area of the design change, no further assessment is required and the change can be treated as a minor change.

c. If Additional Major Design Changes are Necessary: In this case, the proposed aircraft being added to the TC or STC requires additional design changes to be compatible with the prior FAA-approved design change. The additional design changes required to remove the incompatibility must be evaluated in accordance with § 21.101. In the case of an STC, the sum of the design changes for the additional aircraft must be approved as a separate configuration on the STC. This is analogous to adding an additional make/model combination to an approved model list (AML) STC.

(1) If the added aircraft has a later amendment level in the area of the design change, this will affect the § 21.101 evaluation, and the prior FAA-approved design change may require re-substantiation.

(2) If the added aircraft does not have a later amendment level in the area of the design change, the result of the § 21.101 evaluation will establish the certification basis for the additional configuration.

d. Example of an Incompatible Change.

(1) A design approval holder (DAH) is amending its STC to convert an airplane from a passenger to a freighter configuration. The STC is already approved for Boeing Model 737-400 passenger airplanes, S/Ns 1 through 5. The DAH applies to amend the STC to include the additional Model 737-400 passenger airplane, S/N 12. In addition to the existing STC design changes, the DAH determines that additional localized structural modifications are required for S/N 12 to accommodate identified incompatibilities. Since there are new design changes as part of the amended STC that are required to allow the STCs incorporation, the new structural changes are considered related for the certification basis evaluation under § 21.101. In this example, the design changes are classified as not significant. The existing certification basis as previously established under § 21.101 remains valid. The sum of the design changes for S/N 12 must be approved as a separate configuration. If airplane S/N 12 has a later amendment level in the area of the design change, the approved design change (new configuration) may require re-substantiation. In this example, the required design changes by themselves were classified as not significant. If the changes by themselves are extensive enough to be classified as significant, the § 21.101 evaluation will establish the certification basis.

(2) Building on the example in the previous paragraph, if additional changes are being added beyond the required localized structural modifications the DAH proposes, e.g., a different supernumerary seating arrangement for S/N 12, then these changes will be included in the new configuration to be approved. These additional design changes may be arranged into related and unrelated groups for the purposes of evaluation in accordance with § 21.101 (AC 21.101-1B). In this example, the addition of the supernumerary seats would be classified as not significant, and the certification basis of the STC would not change. The certification basis would only change if the certification basis of unmodified S/N 12 was later than the certification basis for the existing STC.

	Incompatibilities Identified	No Incompatibilities Identified
New S/N has a Later Certification Basis	New configuration; evaluate need to re-substantiate	Evaluate need to re-substantiate and update certification basis
New S/N does not have a Later Certification Basis	New configuration; evaluate need to re-substantiate	Administrative addition of S/N

5-2. Expanding an Existing TC or STC to Include a Different Model.

a. An applicant may request an amendment to an existing TC or STC by adding a different aircraft model. In this case, the previously approved certification basis may not be applicable to the new aircraft model. The FAA assesses the entire design change (i.e., changed product to the baseline product) to determine the level of significance for the design change.

b. If the design change is significant, the FAA must establish a new certification basis in accordance with § 21.101.

c. If the design change is not significant, the existing certification basis for the baseline aircraft is used. However, if the certification basis is inadequate, the design requires later appropriate regulatory requirements, including any necessary special conditions.

d. If the design change is substantial, an application for a new TC is required.

5-3. Sequential Design Changes. A product change may incorporate several design changes in a sequential manner. The sequential design changes may not all be accomplished by the same applicant/modifier. If a modifier submits an application for a sequential design change on an application, the final changed product should include the cumulative effects arising from the initial change and all the follow-on changes as part of the description of the change in the initial proposal. The FAA will evaluate the classification of the intended product change on the basis of all the required design changes needed to accomplish the intended product change.

5-4. Incorporating STCs into the Type Design.

a. The incorporation of STCs into the product type design may generate an additional major change when that change is needed to account for incompatibility between several STCs that were initially not intended to be applied concurrently.

b. If the incorporation of the STC(s) does not generate an additional major change, the incorporation is not evaluated pursuant to § 21.101. The existing certification basis should be updated to include the later amendments of the STC(s) being incorporated.

c. If the incorporation of the STC(s) generates an additional major change, the change must be evaluated pursuant to § 21.101, and the existing certification basis should be updated to include the amendments resulting from the application of § 21.101.

5-5. Cumulative Effects. In many cases, a series of design changes over time are made to a product by amending its original TC where the resultant model is significantly different from the original model. Although each changed product, in such a series of design changes, may differ little from its immediate predecessor, the design changes collectively result in a product with considerable differences from the original product. As a result, many changed aeronautical products were not required to demonstrate compliance with all the recent airworthiness standards. Ensure that all cumulative and related effects of previously approved design changes are considered from the last time the certification basis was updated for the affected area when making the determination of significance for the overall design change.

5-6. Using Previously Approved Data.

a. When determining whether a change is significant, § 21.101 requires that the changes be identified for the airplane being modified (baseline airplane). An applicant may elect to use data from a previously approved design that is not on the baseline airplane. However, all proposed design changes, including those that have been previously approved on different airplane configurations (e.g., not on the baseline airplane), must be included as part of the change when determining whether a change is significant.

b. Here is a scenario of the application of this process:

(1) An applicant proposes to modify a passenger airplane to a freighter configuration. The applicant proposes to use approved design data from a previously certified passenger model airplane incorporating a main deck cargo door.

(2) AC 21.101-1B defines converting a passenger airplane to a freighter as a significant product level design change. An applicant may incorrectly claim that the previously approved design on another airplane model listed on the same TCDS should not be subjected to the § 21.101 process because the design does not constitute a change to the TC envisaged by § 21.101(a). Additionally, the applicant may incorrectly propose the previously approved design as a "not affected area" allowing compliance to the previously approved certification basis pursuant to § 21.101(b)(2).

(3) Both positions are contrary to § 21.101. Certification procedures apply to the specific product being changed, not to a similar design approval made on another model (or S/N) aircraft, even if the model is listed on the same TCDS. Section 21.101(a) states: "An applicant for a change to a type certificate must show that the changed product complies with the airworthiness requirements applicable to the category of the product in effect on the date of the application for the change." The term "product" defined in § 21.1(b) is "an aircraft, aircraft engine, or propeller." For the freighter conversion, the product being altered is the passenger model. All design changes required to convert the passenger model to a freighter configuration, whether previously approved on another aircraft model or not, are subject to the CPR process. Therefore, installing a cargo door as part of the freighter conversion is a significant product level design change requiring compliance to the latest regulations.

c. An applicant may find it useful to use similar, or even identical, design features when making product design changes. As such, an applicant may propose to use previously approved design data. Previously approved data can consist of STCs, service bulletins, field approvals, etc. However, prior approved design data from other models (or serial number airplanes of the same model) may not constitute compliance to the regulations required for the proposed changed product. In addition, all design changes, including changes where an applicant proposes to use previously approved design data, must be considered part of the entire product design change. In the case discussed in paragraph 5-6.b above, installing the cargo door on the passenger airplane would be part of the changed area requiring compliance to the latest regulations.

5-7. Removing Design Changes.

a. Approved design changes may be removed after incorporation in an aeronautical product. These design changes will most commonly occur via an STC or service bulletin kit.

b. A product change that the applicant intends at its inception to be removable should include instructions for its removal during the initial certification. The certification basis for both the installed and removed configuration is defined separately on the TCDS or STC.

c. If specific removal instructions and a certification basis corresponding to the removed condition are not established at the time of the initial product change certification, the removal of design changes or portions of those changes may constitute a significant change to type design.

A separate STC or amended TC may be required to remove modifications and the resulting certification basis established for the changed product.

5-8. Applying Later Requirements for Not Significant Changes for Excepted Class. If the existing certification basis does not provide adequate standards (i.e., the design change includes features that were not foreseen in the existing certification basis), the design change must comply with later appropriate regulations. The FAA will progress through each later amendment of a regulation appropriate for the design change beginning with the existing certification basis arriving at the amendment level appropriate for the design change.

5-9. Establishment of a Certification Basis for Amended STC.

a. It is not permissible to revert to a regulatory amendment level earlier than the level established in an STC or TC. This includes all subsequent STC or TC amendments. The FAA cannot approve a certification basis on a proposed STC amendment at a regulatory amendment level earlier than that established in the original/initial STC regardless if the design change on the amended STC is deemed not significant. If an STC holder submits an application for a new STC to introduce a separate configuration of the same type design change, no matter the configuration (even if it is identical), then that STC will be evaluated on its own merits. In the event that an application for a not significant STC is made that affects and/or has an existing significant STC as a pre-requisite, then the certification basis of the proposed STC must not be at an amendment level earlier than the existing significant STC. However, if the proposed certification basis is found to be inadequate, then later regulatory requirements and/or special conditions will be required.

b. Statements such as "elected to comply with …" should no longer be used in new certification basis entries on TCDSs or STCs. For those TCDSs and STCs that include such statements, no revision is necessary. However, such a statement does not allow the applicant or a subsequent applicant to revert to an amendment level earlier than the level established in the STC or amended TC. The new regulatory baseline is applicable for all future design changes made to those changed areas.

c. Accepting an application for the sole purpose of amending the certification to earlier requirements would be contrary to § 21.101 and AC 21.101-B.

5-10. Documentation. The certifying office or delegated organization must document the new certification basis on the amended TCDS, STC, or amended STC, including AML STCs, for all major type design changes. The primary objective is to clearly define the certification basis identifying the regulatory standards and amendment levels for the design change and the areas affected by the change, along with any special conditions, exemptions, ELOS findings, and any special design requirement pursuant to §§ 21.101 and 21.21(b)(2).

a. Document only the certification basis on an amended TCDS or an STC. Do not add extraneous statements such as—

- Elected to comply,
- Compliance to later amendments was voluntary,

- The applicant stepped up or voluntarily stepped up, or
- References to the change category, policy, or staff instructions/orders.

b. If the certification basis for a design change complies with a paragraph and/or sub-paragraph(s) of a regulatory standard, but not the entire standard, document the certification basis by identifying the paragraph(s) and/or sub-paragraph(s) to clearly define the specific regulatory requirement.

c. There may be cases, such as a new model derivation of an existing approved model, where identifying the certification basis for the entire product rather than for the affected area only is recommended. In this case, list the regulatory standard and amendment level for the entire product. In addition, specific product areas (e.g., galley mounting brackets, flight management system, flight control system) may need to be identified as part of the certification basis to document the certification basis. Below is an example:

Requirement	Amendment	Comment
25.XXX	25-YYY	Integrated Standby Flight Display

d. Once later requirements are documented in the certification basis, a new certification basis for that design changed area is established and can never revert to the prior certification basis. This requirement is true even if an applicant voluntarily complies with later regulations. This is applicable for significant and not significant design changes.

e. Document any service bulletins and other prerequisite design change data, including other supplemental STCs, associated with the design change.

f. For not significant design changes where the certification basis is adequate, reference the certification basis listed in the current TCDS on the STC or amended STC.

g. If the changed product complies with a particular amendment level of a regulatory standard, document this by identifying the paragraph(s) and/or sub-paragraphs to clearly define a specific regulatory requirement.

h. Appendix C of this order includes examples documenting a certification basis.

i. The ACO project engineer or the accountable directorate project officer consults the Certification Procedures Branch, AIR-110, if there are any disagreements between the applicant, ACO, and directorate. Follow the Consistency and Standardization Initiative process for these issues.

Chapter 6. Administrative Information

6-1. Distribution. Distribute this order to Washington Headquarters Aircraft Certification Service; Washington Headquarters and regional divisions of the Flight Standards Service; Aircraft Evaluation Groups; Chief Scientist and Technical Advisors; Aircraft Certification Service Directorates; ACOs; Manufacturing Inspection Offices (MIOs); Manufacturing Inspection District and Satellite Offices (MIDOs and MISOs); International Division (AIR-400); and Regulatory Support Division. The term "ACO" refers to the Engine Certification Office, Rotorcraft Certification Office, Special Certification Office, and the Military Certification Office.

6-2. Authority to Change this Order. The issuance, revision, or cancellation of the material in this order is the responsibility of the Design, Manufacturing and Airworthiness Division, AIR-100. The Certification Procedures Branch, AIR–110, makes changes, as required, to carry out the FAA's responsibility to provide guidance on the standardized usage of issue papers.

6-3. Suggestions for Improvement. If you find deficiencies, need clarification, or want to suggest improvements to this order, send FAA Form 1320-19, *Directive Feedback Information*, to: 9-AWA-AVS-AIR-DMO@faa.gov or) complete the form online at https://ksn2.faa.gov/avs/dfs/Pages/Home.aspx.

If you urgently need an interpretation, please contact the Certification Procedures Branch, at 202-267-1575. Always use Form 1320-19, in Appendix D of this order, to follow up each verbal conversation.

6-4. Records Management. Refer to Orders 0000.1, FAA Standard Subject Classification System, and 1350.14, Records Management, or your office Records Management Officer/Directives Management Officer for guidance regarding retention or disposition of records.

Appendix A. Acronyms, Definitions, and Terminology

1. Acronyms.

Acronym	Definition
14 CFR	Title 14 of the Code of Federal Regulation
AC	Advisory Circular
ACO	Aircraft Certification Office
AML	Approved Model List
ANAC	Agência Nacional de Aviação Civil
CAR	Civil Air Regulation
CPN	Certification Project Notification
CPR	Changed Product Rule (i.e., § 21.101)
DAH	Design Approval Holder
EASA	European Aviation Safety Agency
ELOS	Equivalent Level of Safety
FAA	Federal Aviation Administration
HIRF	High Intensity Radiated Fields
MIDO	Manufacturing Inspection District Office
MIO	Manufacturing Inspection Office
MISO	Manufacturing Inspection Satellite office
ODA	Organization Designation Authorization
PNL	Program Notification Letter
STC	Supplemental Type Certificate
TC	Type Certificate
TCCA	Transport Canada Civil Aviation
TCDS	Type Certificate Data Sheet

2. Definitions and Terminology.

a. Aeronautical Product: The terms “aeronautical product” or “product” used in this order includes type certificated aircraft, engines, and propellers.

b. Adequate Certification Basis: The type certification basis for a changed product pursuant to § 21.101 is considered adequate when the FAA determines that it provides appropriate standards for the design change pursuant to §§ 21.101 and 21.21(b)(2) (i.e., when the certification specifications of the applicable airworthiness requirement and prescribed special conditions provide an acceptable level of safety for the changed product and do not result in any unsafe design feature).

c. Assumptions Used for Certification: 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.

Note: The definition of "assumptions used for certification" does not infer that a design change affecting any of the listed assumptions would be classified as "substantial," "significant," or "not significant." For examples that apply the "assumptions used for certification" in the determination of "substantial," "significant," and "not significant," see Appendix A of AC 21.101-1B. Those examples are adopted by the FAA, ANAC, EASA, and TCCA through international collaboration.

d. Baseline Product: An aeronautical product with a specific, defined, approved configuration and certification basis that the applicant proposes to change.

Note: The applicant must clearly identify the specific type design configuration being changed prior to describing the proposed change(s). The applicant must state the unique model or series within the model and the specific product configuration or combination of configurations to be changed limited to configurations affected by the change. For example, the applicant intends to change the baseline aircraft by adding winglets. In this case, the landing gear is considered an area not affected by the change, and it is not related to the change.

The baseline product is an approved type design that exists at the date of application and is representative of—

- A single certified build configuration, or
- Multiple approvals over time (including STC(s) or service bulletins) and may be representative of more than one product serial number.

Note: The type design configuration, for this purpose, could also be based on a proposed future configuration that is expected to be approved at a later date but prior to the proposed changed product.

e. Certification Basis: The applicable airworthiness requirements as established in §§ 21.17 and 21.101, as appropriate; special conditions; ELOS findings; requirements under § 21.21(b)(2); and exemptions applicable to the product to be certificated.

f. Design Change: A change in the type design of an aeronautical product. In the context of this document, the terms "change," "design change," and "type design change" are synonymous.

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

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

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

j. Previous Relevant Design Changes: Previous design changes, the cumulative effect of which could result in a product significantly or substantially different from the original product or model, when considered from the last time the latest regulations were applied.

k. Product Level Change: A change or combination of changes that makes the product distinct from other models of the product (e.g., range, payload, speed, design philosophy). Product level change is defined at the aircraft, aircraft engine, or propeller level of change.

l. 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.

m. Secondary Change: A change that is part of a significant physical change that does not contribute materially to the level of safety. Guidance is contained in chapter 4, paragraph 4-3.f of this order.

n. Significant Change in an Area: For aircraft excepted under § 21.101(c) only: A change in an area is significant if the general configuration or the principles of construction in that area are not retained, or the assumptions used for certification of that area do not remain valid.

o. Substantial Change: 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.

Appendix B. Changed Product Rule (CPR) Decision Record

CHANGED PRODUCT RULE (CPR) DECISION RECORD		
TC/STC No.: Click here to enter text.	**Project Number:** Click here to enter text.	
Step 1: Identify the proposed type design changes to the aeronautical product. (See paragraph 3.2 of AC 21.101-1B)	The proposed type design changes are identified here or in the following document(s): Click here to enter text.	
Note: The Issue Paper process is used to track/document the decisions at Step 2 and Steps 5 through 8 as required.		
Step 2: Is the proposed type design change substantial? (See paragraph 3.3 of AC 21.101-1B)	☐ Yes	**New Type Certificate:** Proceed to § 21.19. Section 21.101 does not apply. A G-1 issue paper will be used to establish and document the certification basis.
	☐ No	**Proceed to Step 3.**
Step 3: Will you use the latest standards? (See paragraph 3.4 of AC 21.101-1B)	☐ Yes	**Latest Requirements:** Propose a certification basis using the standards in effect at the date of application. **Proceed to Step 8.**
	☐ No	**Proceed to Step 4.**
Step 4: Arrange changes into related and unrelated groups. (See paragraph 3.5 of AC 21.101-1B)	**Note:** For multiple groupings, continuation of this process should be split into separate decision records. Groupings may be rationalized and recorded in separate documents: Click here to enter text.	
Step 5: Is each related or unrelated group a significant change? (See paragraph 3.6 of AC 21.101-1B)	☐ Yes	**Proceed to Step 6.**
	☐ No	**Earlier Requirements:** Propose a certification basis using the standards in effect before the date of application but not earlier than the existing certification basis. Certification basis to be defined and documented as indicated (below). **Proceed to Step 8.**
Step 6: Prepare your Certification Basis List. (See paragraph 3.9 of AC 21.101-1B) **Affected Areas:**	The **Affected Area(s)** are detailed here or in the following Certification Basis List document number(s): Click here to enter text. Process and propose each applicable requirement individually. **Proceed to Step 7.**	
Not Affected Areas:	**Existing Requirements:** Continue using the existing certification basis.	
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)	☐ Yes	**Latest Requirements:** Propose a certification basis using the standards in effect on the date of application.
	☐ No	**Earlier Requirements:** 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.
☐ Continuation Sheet(s) Attached	**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.	
Step 8: Ensure the proposed certification basis is adequate. (See paragraph 3.11 of AC 21.101-1B)	If you deem that the certification basis is adequate, submit proposed certification basis to the FAA. If not, consult the FAA. A G-1 issue paper may be needed to document the certification basis.	
Certification Basis:	The certification basis is detailed here or in the following document(s): Click here to enter text.	

Based on the information provided above, I am proposing the certification basis with the following classification for the type design change. (check one)

☐ Significant, pursuant to § 21.101. ☐ Not significant, pursuant to § 21.101.

Click here to enter text.		Click here to enter text.
Printed Name/Title	Signature	Date

Appendix C. STC Examples

Figure C-1. STC Example for Part 23

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

Number: SA00332BO

This certificate issued to: BE Aerospace, Inc., DBA SMR Technologies, Inc.
93 Nettie Fenwick Rd
Fenwick, WV 26202-4000

certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part 23 *of the* Federal Aviation Regulations.

Original Product – Type Certificate Number: A3SO

Make: Piper Aircraft Corporation
Model: PA-32R-301T, PA-32R-301 (HP), PA-32R-301 (SP), PA-32-301, PA-32-301T, PA-32-301FT, PA-32-301XTC

Description of Type Design Change:

Installation of non-hazard ice protection system kits SMR9065-11, SMR9065-12, SMR9065-14, SMR9065-15, SMR9065-16, SMR9065-17, SMR9065-24, SMR9065-25, SMR9065-30, SMR9065-31, SMR9065-40, SMR9065-60, SMR9065-61, SMR9065-62, SMR9065-63, SMR9065-64, SMR9065-65, SMR9065-66, SMR9065-67, SMR9065-68, SMR9065-69, SMR9065-70, SMR9065-71, SMR9065-72, SMR9065-80, SMR9065-81, SMR9065-82, SMR9065-83, SMR9065-84, SMR9065-85, and SMR9065-86, in accordance with Installation Instructions as listed on MDL-0065, Revision H, dated September 12, 2014, or later FAA approved revisions.

Limitations and Conditions:

1. The following Airplane Flight Manual Supplement(s) (AFMS), or later FAA approved revisions must be carried on the airplane when the following kits are installed:
a. The following AFMS are required when SMR kits SMR9065-11, SMR9065-12, SMR9065-61, SMR9065-63, SMR9065-64, or SMR9065-65, are installed: 12-33-126, Rev. IR, dated June 18, 2013; 13-33-067, Rev. IR, dated June 18, 2013; 12-33-123, Rev. IR, dated June 18, 2013; 12-33-124, Rev. IR, dated June 18, 2013.

(Limitations and Conditions continued on page 3 of 4)

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, and revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of Application: March 9, 2012

Date of Issuance: June 18, 2013

Date Reissued:

Date Amended: October 28, 2014

By Direction of the Administrator

Signature _____

Title Scott A. Horn
Acting Manager, Airplane Certification Office
Southwest Region

FAA Form 8110-2 (5/14) Page 1 of 4

Figure C-1. STC Example for Part 23 (continued)

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Aircraft Certification Office of the transfer of this Supplemental Type Certificate. The FAA will reissue the certificate in the name of the transferee and forward it to him.

Transfer Endorsement

Transfer the ownership of Supplemental Type Certificate Number: SA00332BO

To (Name and address of transferee)

From (Name and address of grantor)

Extent of Authority (if licensing agreement):

Date of transfer:

Signature of grantor: _____

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both. This certificate may be transferred or made available to third persons by licensing agreements in accordance with 14 CFR 21.47. Possession of this Supplemental Type Certificate (STC) document by persons other than the STC holder does not constitute rights to the design data nor to alter an aircraft, aircraft engine, or propeller. The STC's supporting documentation (drawings, instructions, specifications, flight manual supplements, etc.) is the property of the STC holder. An STC holder who allows a person to use the STC to alter an aircraft, aircraft engine, or propeller must provide that person with written permission acceptable to the FAA. (Ref. 14 CFR 21.120).

FAA Form 8110-2 (5/14) Page 2 of 4

Figure C-1. STC Example for Part 23 (continued)

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)
Number: SA00332BO

Date of Issuance: June 18, 2013

Limitations and Conditions: (continued from Page 1 of 4)

b. The following AFMS are required when SMR kit SMR9065-60, SMR9065-62, SMR9065-66, SMR9065-67, SMR9065-68, or SMR9065-69, are installed: 12-33-126, Rev. IR, dated June 18, 2013; 12-33-125, Rev. IR, dated June 18, 2013; 12-33-123, Rev. IR, dated June 18, 2013; 12-33-124, Rev. IR, dated June 18, 2013.
c. The following AFMS are required when SMR kits SMR9065-14, SMR9065-15, SMR9065-70, SMR9065-71 or SMR9065-72 are installed: 12-33-126, Rev. IR, dated June 18, 2013.
d. The following AFMS are required when SMR kits SMR9065-16, SMR9065-40, SMR9065-81, SMR9065-83 or SMR9065-84, are installed: 13-33-067, Rev. IR, dated June 18, 2013.
e. The following AFMS are required when SMR kit SMR9065-17, SMR9065-80, SMR9065-82, SMR9065-85, or SMR9065-86, are installed: 12-33-125, Rev. IR, dated June 18, 2013.
f. The following AFMS are required when kits SMR9065-30 or SMR9065-31 is installed: 12-33-123, Rev. IR. Dated June 18, 2013.
g. The following AFMS are required when kits SMR9065-24 or SMR9065-25 is installed: 12-33-124, Rev. IR. Dated June 18, 2013.

2. The following Maintenance Instructions for Continued Airworthiness (ICA), or later FAA accepted revisions, are required for this modification
a. When kit SMR9065-11, SMR9065-12, SMR9065-60, SMR9065-61, SMR9065-62, SMR9065-63, SMR9065-64, SMR9065-65, SMR9065-66, SMR9065-67, SMR9065-68 or SMR9065-69 is installed: 12-33-129, Rev. 7, dated June 4, 2014; 12-33-119, Rev. 5, dated February 28, 2014; 12-33-128, Rev. 4, dated October 30, 2013; 12-33-117, Rev. 5 dated October 30, 2013.
b. When kit SMR9065-14, SMR9065-15, SMR9065-70, SMR9065-71 or SMR9065-72 is installed: 12-33-129, Rev. 7, dated June 4, 2014.
c. When kit SMR9065-16, SMR9065-17, SMR9065-40, SMR9065-80, SMR9065-81, SMR9065-82, SMR9065-83, SMR9065-84, SMR9065-85 or SMR9065-86 is installed: 12-33-119, Rev. 5, dated February 28, 2014.
d. When kit SMR9065-24 or SMR9065-25 is installed: 12-33-128, Rev. 4, dated October 30, 2013.
e. When kit SMR9065-30 or SMR9065-31 is installed: 12-33-117, Rev. 5, dated October 30, 2013.

3. 14 Volt System aircraft must upgrade to a National AirParts Inc. P/N P312RN, 120 Amp Alternator. This can be installed via its PMA, but a separate logbook entry must be made if this alternator is installed.

4. 14 Volt System PA-32R-301 and PA-32R-301T aircraft must have an Oildyne hydraulic pump, Piper P/N 481-879, installed. Prestolite hydraulic pumps must be replaced with Oildyne hydraulic pumps using Piper kit P/N 764-785. A separate logbook entry must be made if the Oildyne pump is installed, as it is not part of this STC.

5. This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any of those other previously approved modifications will produce no adverse effect upon the airworthiness of that aircraft.

6. Flight into known icing prohibited with this STC.

Figure C-1. STC Example for Part 23 (continued)

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)
Number: SA00332BO

Date of Issuance: June 18, 2013

Type Certificate Data Sheet:
Piper Aircraft Company TCDS A3SO is modified for this STC as follows:

Certification Basis:
Based on 14 CFR § 21.115 and § 21.101, and the FAA policy for design changes that are identified as not significant in FAA Order 8110.48, the certification basis for the Piper PA-32 is as follows:

a. The type certified basis for parts not changed or not affected by the change is shown on TCDS A3SO.

b. The modification certification basis for parts changed or affected by the change since the reference application date, March 9, 2012, is based upon CAR 3 as amended to CAR 3-8 and part 23 as amended by Amendment 23-62 as follows:

Regulation at the latest amendment 23-00 through 23-62
23.21, 23.23, 23.25, 23.29, 23.31, 23.201, 23.203, 23.207, 23.605, 23.1301, 23.1309 (a) (c) (d), 23.1351 (a), 23.1357 (a) (b) (c) (d), 23.1365 (a) (b) (d) (e) (f), 23.1367, 23.1416 (b) (c), 23.1438 (b), 23.1501 (a) (b), 23.1525, 23.1529, 23.1555 (a), 23.1581 (a) (b) (c) (d), 23.1583 (h) (m), 23.1585 (j).

Regulation at CAR 3-8

3.83, 3.85, 3.106, 3.114, 3.117, 3.118, 3.159, 3.171, 3.172, 3.173, 3.291, 3.292, 3.311, 3.712

If the holder agrees to permit another person to use this certification to alter the product, the holder shall give the other person written evidence of that permission.

……..END……

Figure C-2. STC Example for Part 25

United States of America
Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

Number **ST02241SE**

This certificate, issued to **Aviation Partners Incorporated**
7299 Perimeter Road South
Seattle, WA 98108-3812

certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part **25** *of the* **Federal Aviation Regulations.**

Original Product—Type Certificate Number: A46EU
Make: Dassault Aviation
Model: Mystere-Falcon 50

Description of the Type Design Change: Fabrication and Installation of blended winglets in accordance with Aviation Partners Inc. (API) Master Drawing List APF5-0620, Revision A, dated July 30, 2012, or later Federal Aviation Administration (FAA) approved revision.

Limitations and Conditions: Approval of this change in type design applies to the above listed aircraft only. This approval should not be extended to other aircraft of these models on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and any of the other previously approved modifications, including changes in type design, will introduce no adverse effect upon the airworthiness of the aircraft.

This modification must be Maintained in accordance with the Instructions for Continued Airworthiness (ICA), API Document APF5-0611, Revision A, dated September 12, 2012, or later FAA-accepted revision. The modified aircraft must be Operated in accordance with the FAA-approved Airplane Flight Manual Supplement (FMS) API document APF5-0601, Code 001, dated September 12, 2012, or later FAA-approved revision. A copy of this certificate, the FMS and ICA must be maintained as part of the permanent records for the modified aircraft.

(See Continuation Sheet Page 3 of 3 Pages)

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: June 14, 2005 *Date reissued:*

Date of issuance: September 14, 2012 *Date amended:*

FEDERAL AVIATION ADMINISTRATION

By direction of the Administrator

(Signature)

Acting Manager, Seattle Aircraft Certification Office
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

Figure C-2. STC Example for Part 25 (continued)

United States of America
Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate
(Continuation Sheet)

Number **ST02241SE**

Aviation Partners Incorporated

Issued: September 14, 2012
Reissued:
Amended:

Limitations and Conditions continued:
If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

Certification Basis:
The certification basis for this modification is based upon Title 14 Code of Federal Regulations (CFR) part 25 as specified in Type Certificate Data Sheet A46EU, except for areas changed or affected by the design change, for which the certification basis is 14 CFR part 25, effective February 1, 1965, including Amendments 25-1 through 25-120, with the following exceptions:

Section (§)	Amendment	Section (§)	Amendment
§ 25.103	25-0	§ 25.161	25-115
§ 25.105	25-0	§ 25.171	25-7
§ 25.107	25-38	§ 25.173	25-7
§ 25.109	25-0	§ 25.175	25-115
§ 25.111	25-6	§ 25.177	25-108
§ 25.113	25-23	§ 25.181	25-108
§ 25.115	25-0	§ 25.201	25-108
§ 25.117	25-0	§ 25.203	25-84
§ 25.119	25-94	§ 25.207	25-42
§ 25.121	25-84	§ 25.233	25-108
§ 25.123	25-0	§ 25.237	25-108
§ 25.125	25-72	§ 25.571	25-86
§ 25.143	25-108	§ 25.629	25-23
§ 25.145	25-108	§ 25.671	25-23
§ 25.147	25-115	§ 25.1317	25-122
§ 25.149	25-72	§ 25.1329	25-46

Exemptions from 14 CFR part 25:

- Exemption from § 25.671(c)(2) for hydraulic failures with loss of fluid (Exemption No. 10617, dated August 29, 2012)

Equivalent level of safety findings have been made for the following regulations:

- § 25.1419 – documented in Transport Airplane Directorate Equivalent Level of Safety Memo ST11512SE-T-ES-1.

- END -

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA FORM 8110-2-1 (10-69) PAGE 3 OF 3 PAGES

Figure C-3. STC Example for Part 27/29

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

Number SA00339BO

This certificate issued to:

Metro Aviation, Inc.
1214 Hawn Avenue
Shreveport, LA 71107

certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part 27 of the Federal Aviation Regulations.

Original Product - Type Certificate Number: H88EU
Make: Airbus Helicopters Deutschland GmbH
Model: EC135P2+, EC135T2+

Description of Type Design Change:
Installation of Single pilot IFR KIT135M-GTN-150 with Garmin GTN 650-750 WAAS Navigators in accordance with Metro Aviation, Inc. Master Document List (MDL), MDL135M-GTN-150, Rev G, or later FAA approved revision.

Limitations and Conditions:
1. Operation must be in accordance with Metro Aviation Rotorcraft Flight Manual Supplement (RFMS) FMS135M-GTN-001, Rev A, FAA approved on May 28, 2014, or later FAA approved revision.
   The RFMS must be carried in the aircraft during all flights.

(continued on Page 3 of 3)

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, and revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of Application: April 5, 2013
Date of Issuance: February 21, 2014
Date reissued:
Date amended: May 28, 2014

By direction of the Administrator

Signature _____
Robert G. Mann

Manager, Boston Aircraft Certification Office
Title _____

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both. This certificate may be transferred or made available to third persons by licensing agreements in accordance with 14 CFR 21.47. Possession of this Supplemental Type Certificate (STC) document by persons other than the STC holder does not constitute rights to the design data nor to alter an aircraft, aircraft engine, or propeller. The STC's supporting documentation (drawings, instructions, specifications, flight manual supplements, etc.) is the property of the STC holder. An STC holder who allows a person to use the STC to alter an aircraft, aircraft engine, or propeller must provide that person with written permission acceptable to the FAA. (Ref. 14 CFR 21.120).

Figure C-3. STC Example for Part 27/29 (continued)

SUPPLEMENTAL TYPE CERTIFICATE, FAA FORM 8110-2
(CONTINUED)

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Aircraft Certification Office of the transfer of this Supplemental Type Certificate. The FAA will reissue the certificate in the name of the transferee and forward it to him.

TRANSFER
ENDORSEMENT

Transfer the ownership of Supplemental Type Certificate Number:

To *(Name of transferee)*

(Address of transferee)

(Number and street)

(City, State, and ZIP Code)

From *(Name of grantor)*

(Address of grantor)

(Number and street)

(City, State, and ZIP Code)

Extent of Authority (if licensing agreement):

Date of Transfer:

Signature of grantor:

FAA Form 8110-2 (8/13) Page 2 of 3

Figure C-3. STC Example for Part 27/29 (continued)

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

Number SA00339BO
May 28, 2014

Limitations and Conditions: (continued from Page 1 of 3)

2. Maintenance must be in accordance with Metro Aviation, Inc. Instructions for Continued Airworthiness (ICA), EMM135M-GTN-001, Rev B, dated April 23, 2014, or later FAA accepted revision. The ICA must be made available to the operator at the time of installation.
3. Compatibility of this design with previously approved modifications must be determined by the installer.

Certification Basis:
Based on 14 CFR § 21.115 and § 21.101, and the FAA policy for design changes that are identified as not significant in FAA Order 8110.48, the certification basis for the Airbus Helicopters Deutschland GmbH Model EC135P2+ and EC135T2+ aircraft is as follows:

a. The type certification basis for parts **not changed or not affected** by the change is shown on TCDS H88EU.

b. The modification certification basis for parts **changed or affected** by the change since the amendment application date, March 6, 2014, is based upon part 27 as amended by Amendment 27-47 as follows:

Regulations at the latest amendment 27-0 through 27-47
27.21, 27.29, 27.251, 27.301, 27.303, 27.305(a), 27.307(a), 27.601(a), 27.603, 27.605(a), 27.607, 27.609(a), 27.611, 27.613(a)(b)(c)(d), 27.619, 27.771(a)(b)(c), 27.773(a)(1)(b), 27.775, 27.777(a), 27.787(b)(c), 27.1301, 27.1303, 27.1307(d)(e), 27.1321(a)(c)(d), 27.1322, 27.1323, 27.1325, 27.1327, 27.1351(a)(b)(1)(c)(d)(e), 27.1353(a)(b), 27.1357(a)(b)(c)(d), 27.1367, 27.1381, 27.1501, 27.1523, 27.1525, 27.1527, 27.1529, 27.1541, 27.1543, 27.1545, 27.1547, 27.1555(a), 27.1559, 27.1581, 27.1583(c)(e), 27.1585(a), 27.1589, 27A.1, 27A.2, 27A.3, 27A.4, 27B.8, 27B.9

Regulations at an intermediate amendment
None

Regulations at the amendment level in TCDS H88EU
27.1, 27.2, 27.561(a)(b)(3)(c), 27.610, 27.625(a)(c), 27.853(a), 27.1309, 27.1329(e), 27.1365

----------END----------

Figure C-4. STC Example for Part 33

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

IMPORT

Number: SE03495NY

This certificate issued to: Helicopteres Guimbal S.A.
Aerodrome d'Aix-en-Provence
13290 Les Milles, France

certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Car 13 *of the Civil Air Regulations.*

Original Product – Type Certificate Number: E-286

Make: Lycoming Engines
Model: O-360-J2A

Description of Type Design Change:

Installation of an electronic ignition system, an air conditioning compressor, and an oil filter adapter in accordance with Helicopteres Guimbal document "Installation, Operator's and Maintenance Manual," Doc. No. P/N J45-001, Issue 04, dated October 2, 2014 or later EASA approved revisions, and Type Design Definition "O360-J2A Plasma STC Parts List" Doc. No. J45-002, Revision F, dated December 31, 2012 or later EASA approved revisions.

(See Description of Type Design Change continued on Page 3 of 3)

Limitations and Conditions:

1. The ignition system control unit must not be installed in a dedicated engine fire zone. The installation conditions and assumptions are defined in the Installation Manual that is specified above.
2. This STC is exclusive of any rotorcraft or aircraft installation. A separate FAA certification is required for installation of the engine with this modification into any rotorcraft or aircraft.

(See Limitations and Conditions continued on Page 3 of 3)

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, and revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: January 21, 2013

Date of issuance: January 14, 2015

Date reissued:

Date amended:

By direction of the Administrator

Signature _____

Title Gaetano Sciortino
Manager
New York Aircraft Certification Office

Figure C-4. STC Example for Part 33 (continued)

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Aircraft Certification Office of the transfer of this Supplemental Type Certificate. The FAA will reissue the certificate in the name of the transferee and forward it to him.

Transfer Endorsement

Transfer the ownership of Supplemental Type Certificate Number: SE03495NY

To (Name and address of transferee)

From (Name and address of grantor)

Extent of Authority (if licensing agreement):

Date of transfer:

Signature of grantor: _____

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both. This certificate may be transferred or made available to third persons by licensing agreements in accordance with 14 CFR 21.47. Possession of this Supplemental Type Certificate (STC) document by persons other than the STC holder does not constitute rights to the design data nor to alter an aircraft, aircraft engine, or propeller. The STC's supporting documentation (drawings, instructions, specifications, flight manual supplements, etc.) is the property of the STC holder. An STC holder who allows a person to use the STC to alter an aircraft, aircraft engine, or propeller must provide that person with written permission acceptable to the FAA. (Ref. 14 CFR 21.120).

FAA Form 8110-2 (8/13) Page 2

Figure C-4. STC Example for Part 33 (continued)

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)
Number: SE03495NY

Date Issued: January 14, 2014

Description of Type Design Change (continued):

The following Helicopteres Guimbal instructions for operation, maintenance, and inspection document is required with this installation: Helicopteres Guimbal document "Installation, Operator's and Maintenance Manual," Doc. No. P/N J45-001, Issue 04, dated October 2, 2014 or later EASA approved revisions.

Limitations and Conditions (continued):

3. The data in the TCDS E-286 remains valid except for the following:
   Dimensions:
   Overall height: 602 mm (23.7 in.)
   Fuels:
   - Aviation gasoline, 100 or 100LL per ASTM D910, B95/130 CIS or RH95/130.
   - Unleaded fuel with a minimum octane rating of 98 as outlined in Doc. No. P/N J45-001, Issue 04, dated October 2, 2014, Section 2, or later EASA approved revisions.

   Environmental Conditions:
   Refer to Helicopteres Guimbal document "Installation, Operator's and Maintenance Manual," Doc. No. P/N J45-001, Issue 04, dated October 2, 2014, Section 7, or later EASA approved revisions.
4. Mandatory replacement time and/or inspection intervals are defined in the FAA Approved "Airworthiness Limitation" section of the Helicopteres Guimbal document "Installation, Operator's and Maintenance Manual," Doc. No. P/N J45-001, Issue 04, dated October 2, 2014.
5. The Installer must determine whether this design change is compatible with previously approved modifications.
6. If the holder agrees to permit another person to use this certificate to alter a product, the holder must give the other person written evidence of that permission.

Certification Basis:

Based on 14 CFR §§ 21.115 and 21.101, and the FAA policy for changes that are not significant in FAA Order 8110.48, the certification basis for this modification are as follows:

- The type certification basis for the Lycoming Engines O-360-J2A engine is shown on TCDS No. E-286 for parts not changed or not affected by the change.

- The type certification basis for the Lycoming Engines O-360-J2A engine is shown on TCDS No. E-286 for parts changed or affected by the change with the following CFR 14 exceptions:

Regulations at the amendment 33-0 through 33-22:

33.1	33.3	33.4	33.5	33.7	33.8
33.11	33.15	33.17	33.19	33.21	33.23
33.25	33.27	33.28	33.29	33.31	33.33
33.34	33.35	33.37	33.39	33.42	33.43
33.45	33.47	33.49	33.51	33.53	33.55
33.57					

-----END-----

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.

Section No.	Title	At Amdt. 25-
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

14 CFR Part 34, Fuel Venting and Exhaust Emission Requirements for Turbine Engine Powered, through Amendment 34-5. The certification basis for emissions also includes compliance to the International Civil Aviation Organization (ICAO) Annex 16, Volume II, Third Edition, Part III, Chapter 2, Section 2.2.2 for SN, Section 2.3.2 for CO and HC, Section 2.3.2.e.3 for NOx (also known as CAE P/8), and Part II Chapter 2 for fuel venting, which have been demonstrated.

14 CFR Part 36, Noise Standards: Aircraft Type Certification and Airworthiness Certification, through Amendment 36-28. The certification basis for noise also includes compliance to ICAO Annex 16, Volume I, Chapter 4, Amendment 9, (5th Edition).

The Following Optional Design Regulations have been complied with:

Ditching: 14 CFR §§ 25.801, 25.1411(d), (e), (f), (g) and 25.1415
Ice Protection: 14 CFR § 25.1419
ETOPS: The 787-9 has been evaluated in accordance with the type design requirements of 14 CFR § 25.3(b)(2) and 25.1535 and found suitable for greater than 180-minute ETOPS operations when operated and maintained in accordance with Boeing Document No. D021Z002-01, "Model 787 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

Special Conditions with respect to the following subjects apply to the Model 787-9:

Special Condition	Subject
25-348-SC	Composite Wing and Fuel Tank Structure—Fire Protection Requirements
25-354A-SC	Interaction of Systems and Structures, Electronic Flight Control System-Control Surface Awareness, High Intensity Radiated Fields (HIRF) Protection, Limit Engine Torque Loads for Sudden Engine Stoppage, and Design Roll Maneuver Requirement

ADDITIONAL DESIGN REQUIREMENTS AND CONDITIONS:

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

In-flight Engine Restart

The Boeing Model 787 engines incorporate numerous technological advances intended to increase efficiency and reliability. However, some of these features have the potential to decrease engine in-flight starting performance relative to 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
3. Redundant mechanical control interface between the flight crew and the FADEC.

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

that is Security Considerations

The Boeing Model 787-9 was granted an exception per 14 CFR 21.101(b) for §§25.795(b)(1), (c)(2) and (c)(3) based on design feature similar to but not equivalent to their intent. These security features must be in consideration in any subsequent type design change, modification, or repair to ensure the level of safety designed into the 787-9 is maintained. Modifications that reduce flight critical system separation or adversely impact flight deck smoke prevention, system separation and protections for searching above the overhead stowage compartments are not acceptable.

Appendix D. FAA Form 1320-19, Directive Feedback Information

Directive Feedback Information

Please submit any written comments or recommendations for improving this directive, or suggest new items or subjects to be added to it. Also, if you find an error, please tell us about it.

Subject: Order 8110.48A

To: 9-AWA-AVS-AIR-DMO@faa.gov
or complete the form online at https://ksn2.faa.gov/avs/dfs/Pages/Home.aspx

(Please check all appropriate line items)

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows:

(attach separate sheet if necessary)

☐ In a future change to this directive, please cover the following subject

(briefly describe what you want added):

☐ Other comments:

☐ I would like to discuss the above. Please contact me.

Submitted by: _____ Date: _____

FAA Form 1320-19 (10-98)