certification basis incorporated by reference in the type-certificate and with any other certification specification which is directly related, unless the Agency also finds that compliance with that amendment does not contribute materially to the level of safety of the changed product or is impractical.

(d) If the Agency finds that the certification specifications applicable on the date of the application for the change do not provide adequate standards with respect to the proposed change, the change and areas affected by the change shall also comply with any special conditions, and amendments to those special conditions, prescribed by the Agency in accordance with point 21.B.75, to provide a level of safety equivalent to that established by the certification specifications applicable on the date of the application for the change.

(e) By derogation from points (a), (b) and (c), the change and areas affected by the change may comply with an alternative to a certification specification designated by the Agency if proposed by the applicant, provided that the Agency finds that the alternative provides a level of safety which is:

1. in the case of a type-certificate:

   (i) equivalent to that of the certification specifications designated by the Agency under (a), (b) or (c) above; or

   (ii) compliant with the essential requirements of Annex II to Regulation (EU) 2018/1139;

2. in the case of a restricted type-certificate, adequate with regard to the intended use.

(f) If an applicant chooses to comply with a certification specification set out in an amendment that becomes applicable after submitting the application for a change to a type-certificate, the change and areas affected by the change shall also comply with any other certification specification which is directly related.

(g) When the application for a change to a type-certificate for an aircraft includes, or is supplemented after the initial application to include, changes to the operational suitability data, the operational suitability data certification basis shall be established in accordance with points (a)-(f).

GM 21.A.101 Establishing the certification basis of changed aeronautical products

ED Decision 2019/018/R9/018/R

Foreword

This guidance material (GM) provides guidance for the application of the 'Changed Product Rule (CPR)', pursuant to point 21.A.101, *Designation of the applicable certification specifications and environmental protection requirements*, and 21.A.19, *Changes requiring a new type certificate*, for changes made to type-certified aeronautical products.

1. INTRODUCTION

1.1. Purpose.

This GM provides guidance for establishing the certification basis for changed aeronautical products pursuant to point 21.A.101, *Designation of the applicable certification specifications and environmental protection requirements*. The guidance is also intended to help applicants and approved design organisations to determine

whether it will be necessary to apply for a new type certificate (TC) under point 21.A.19, *Changes requiring a new type certificate*. The guidance describes the process for establishing the certification basis for a change to a TC, for a supplemental type certificate (STC), or for a change to an STC, detailing the requirements (evaluations, classifications, and decisions) throughout the process.

1.2. Applicability.

1.2.1 This GM is for an applicant that applies for changes to TCs under Subpart D, for STCs, or changes to STCs under Subpart E, or for changes to European Technical Standard Order Authorisations (ETSOAs) for auxiliary power units (APUs) under Subpart O. This GM is also for approved design organisations that classify changes and approve minor changes under their 21.A.263(c)(1) and (2) privileges.

1.2.2 This GM applies to major changes under point 21.A.101 for aeronautical products certified under Part 21, and the certification specifications (CSs) applicable to the changed product (CS-23, CS-25, CS-27, CS-29, CS-MMEL, CS-FCD, CS-CCD, etc.). References to 'change' include the change and areas affected by the change pursuant to point 21.A.101.

1.2.3 Minor changes are within the scope of 21.A.101 and this GM but are automatically considered to not be significant under the 'does not contribute materially to the level of safety' provision of point 21.A.101(b).

1.2.4 This GM also applies to changes to restricted type certificates.

1.2.5 The term 'aeronautical product', or 'product', means a type-certified aircraft, aircraft engine, or propeller and, for the purpose of this GM, an ETSOA'd APU.

1.2.6 This GM primarily provides guidance for the designation of applicable airworthiness certification specifications and other airworthiness standards for the type-certification basis for the changed product. However, portions of this GM, as specified in GM1 21.A.101(g), can be applied by analogy to establish the operational suitability data (OSD) certification basis for the changed product. This GM is not intended to be used to determine the applicable environmental protection requirements (aircraft noise, fuel venting, and engine exhaust emissions and aeroplane CO_2 emissions requirements) for changed products, as they are designated through point 21.B.85.

1.2.7 This GM is not mandatory and is not an EU regulation. This GM describes an acceptable means, but not the only means, to comply with point 21.A.101. However, an applicant who uses the means described in this GM must follow it entirely.

1.3. Reserved.

1.4. GM Content

This GM contains 5 chapters and 10 appendices.

1.4.1 This chapter clarifies the purpose of this GM, describes its content, specifies the intended audience affected by this GM, clarifies which changes are within the scope of this GM, and references the definitions and terminology used in this GM.

1.4.2 Chapter 2 provides a general overview of points 21.A.101 and 21.A.19, clarifies the main principles and safety objectives, and directs an applicant to the applicable guidance contained in subsequent chapters of this GM.

1.4.3 Chapter 3 contains guidance for the implementation of point 21.A.101(b) to establish the certification basis for changed aeronautical products. It describes in detail the various steps for developing the certification basis, which is a process that applies to all changes to aeronautical products. Chapter 3 also addresses the point 21.A.19 considerations for identifying the conditions under which an applicant for a change is required to submit an application for a new TC, and it provides guidance regarding the stage of the process at which this assessment is performed.

1.4.4 Chapter 4 provides guidance about products excepted from the requirement of point 21.A.101(a).

1.4.5 Chapter 5 contains considerations for:

— design-related operating requirements,

— defining a baseline product,

— predecessor standards,

— using special conditions under point 21.A.101(d),

— documenting revisions to the TC basis,

— incorporating STCs into the type design,

— removing changes,

— determining a certification basis after removing an approved change, and

— sequential changes.

1.4.6 Appendix A contains examples of typical type design changes for small aeroplanes, large aeroplanes, rotorcraft, engines, and propellers. The European Union Aviation Safety Agency (EASA) has categorised these examples into individual tables according to the classifications of design change: 'substantial', 'significant', and 'not significant'.

1.4.7 Appendix B contains application charts for applying the point 21.A.101 process, including the excepted process.

1.4.8 Appendix C contains one method for determining the changed and affected areas of a product.

1.4.9 Appendix D contains additional guidance on affected areas that is not discussed in other parts of this GM.

1.4.10 Appendix E provides detailed guidance with examples for evaluating the 'impracticality' exception in the rule.

1.4.11 Appendix F provides guidance with examples on the use of relevant service experience in the certification process as one way to demonstrate that a later amendment may not contribute materially to the level of safety, allowing the use of earlier certification specifications.

1.4.12 Appendix G provides an example CPR decision record.

1.4.13 Appendix H provides examples of documenting a proposed certification basis list.

1.4.14 Appendix I lists the Part 21 points related to this GM.

1.4.15 Appendix J lists the definitions and terminology applicable for the application of the rule.

1.5. Terms Used in this GM.

1.5.1 The following terms are used interchangeably and have the same meaning: 'specifications', 'standards', 'certification specifications' and 'certification standards'. They refer to the elements of the type-certification basis for airworthiness or OSD certification basis.

1.5.2 The term 'certification basis' refers to the type-certification basis for airworthiness provided for in point 21.B.80 and the operational suitability data (OSD) certification basis provided for in point 21.B.82.

For more terms, consult Appendix J.

2. OVERVIEW OF POINTS 21.A.19 AND 21.A.101

2.1. Point 21.A.19.

2.1.1 Point 21.A.19 requires an applicant to apply for a new TC for a changed product if EASA finds that the change to the design, power, thrust, or weight is so extensive that a substantially complete investigation of compliance with the applicable type-certification basis is required.

2.1.2 Changes that require a substantial re-evaluation of the compliance findings of the product are referred to as 'substantial changes'. For guidance, see paragraph 3.3 in Chapter 3 of this GM. Appendix A of this GM provides examples of changes that will require a new TC.

2.1.3 If EASA determines through point 21.A.19 that a proposed change does not require a new TC, see point 21.A.101 for the applicable requirements to develop the certification basis for the proposed change. For guidance, see Chapter 3 and the examples in Appendix A of this GM.

2.2. Point 21.A.101.

2.2.1 Point 21.A.101(a).

Point 21.A.101(a) requires a change to a TC, and the areas affected by the change to comply with the certification specifications that are applicable to the changed product and that are in effect on the date of application for the change (i.e. the latest certification standards in effect at the time of application), unless the change meets the criteria for the exceptions identified in point 21.A.101(b) or (c), or unless an applicant chooses to comply with the certification specifications of later effective amendments* in accordance with point 21.A.101(f). The intent of point 21.A.101 is to enhance safety by incorporating the latest requirements into the certification basis for the changed product to the greatest extent practicable.

*NOTE: Certification specifications that were amended after the date of application.

2.2.2 Point 21.A.101(b).

Point 21.A.101(b) pertains to when an applicant may show that a changed product complies with an earlier amendment of a certification specification, provided that the earlier amendment is considered to be adequate and meets the criteria in point 21.A.101(b)(1), (2), or (3). When changes involve features or characteristics that

are novel and unusual in comparison with the airworthiness standard at the proposed amendment, more recent airworthiness standards and/or special conditions will be applied for these features.

An applicant is considered to comply with the earlier amendment of the certification specifications consistent with point 21.A.101(b), when:

(a) a change is not significant (see point 21.A.101(b)(1));

(b) an area, system, part or appliance is not affected by the change (see point 21.A.101(b)(2));

(c) compliance with a later amendment for a significant change does not contribute materially to the level of safety (see point 21.A.101(b)(3)); or

(d) compliance with the latest amendment would be impractical (see point 21.A.101(b)(3)).

Earlier amendments may not precede the amendment level of the certification basis of the identified baseline product.

Points 21.A.101(b)(1)(i) and (ii) pertain to changes that meet the automatic criteria where the change is significant.

2.2.3 Point 21.A.101(c).

Point 21.A.101(c) provides an exception from the requirements of point 21.A.101(a) for a change to certain aircraft with less than the specified maximum weight. An applicant who applies for a change to an aircraft (other than rotorcraft) of 2 722 kg (6 000 lb) or less maximum weight, or to a non-turbine-powered rotorcraft of 1 361 kg (3 000 lb) or less maximum weight, can show that the changed product complies with the standards incorporated by reference in the type certificate. An applicant can also elect to comply or may be required to comply with the later standards. See paragraph 4.1 of this GM for specific guidance on this provision.

2.2.4 Point 21.A.101(d).

Point 21.A.101(d) provides for the use of special conditions, under 21.B.75, when the proposed certification basis and any later certification specifications do not provide adequate standards for the proposed change because of a novel or unusual design feature.

2.2.5 Point 21.A.101(e).

Point 21.A.101(e) provides the legal basis under which an applicant may propose to certify a change and the areas affected by the change against alternative requirements to the certification specifications established by EASA.

2.2.6 Point 21.A.101(f).

Point 21.A.101(f) requires that if an applicant chooses (elects) to comply with a certification specification or an amendment to the certification specifications that is effective after the filing of the application for a change to a TC, the applicant shall also comply with any other certification specifications that EASA finds are directly related. The certification specifications which are directly related must be, for the purpose of compliance demonstration, considered together at the same amendment level to be consistent.

2.2.7 Point 21.A.101(g).

Point 21.A.101(g) pertains to the designation of the applicable OSD certification basis when the application for a change to a type certificate for an aircraft includes, or is supplemented after the initial application to include, changes to the OSD. It implies that the same requirements of paragraphs (a) and (f) that are applicable to the establishment of the airworthiness type-certification basis also apply to the establishment of the OSD certification basis. For specific guidance, see GM1 21.A.101(g).

3. PROCESS FOR ESTABLISHING THE CERTIFICATION BASIS FOR CHANGED PRODUCTS

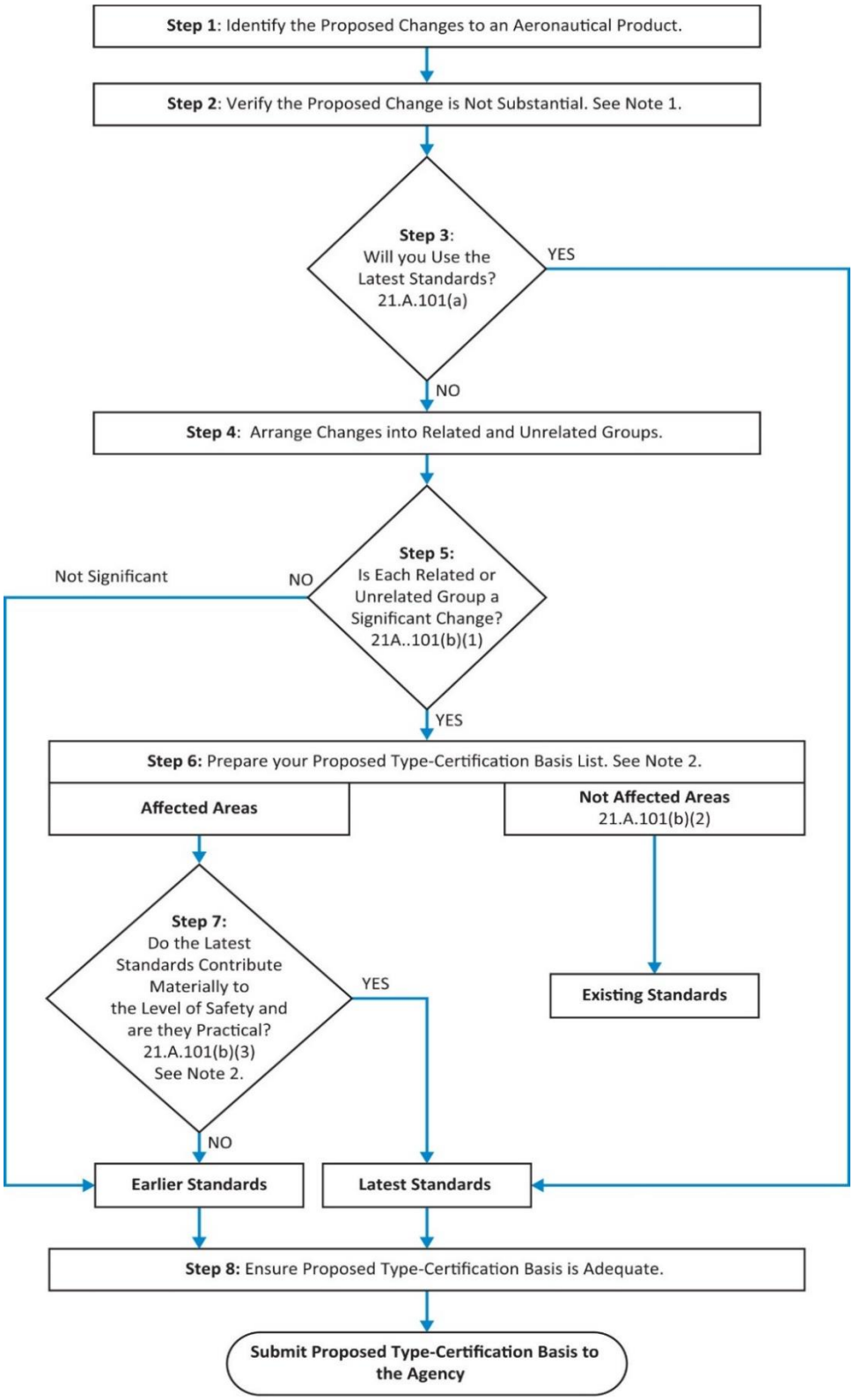
3.1. Overview.

3.1.1 The applicant and EASA both have responsibilities under point 21.A.101(a) and (b). As an applicant for the certification of a change, the applicant must demonstrate that the change and areas affected by the change comply with the latest applicable certification specifications unless the applicant proposes exception(s) under point 21.A.101(b). An applicant proposing exception(s) should make a preliminary classification whether the change is 'significant' or 'not significant', and propose an appropriate certification basis. EASA is responsible for determining whether the applicant's classification of the change, and proposal for the certification basis, are consistent with the applicable rules and their interpretation. The EASA determination does not depend on whether the TC holder or applicant for an STC is originating the change. The certification basis can vary depending on the magnitude and scope of the change. The steps below present a streamlined approach for making this determination.

3.1.2 The tables in appendix A of this GM are examples of classifications of typical type design changes. See paragraph 3.6.3 of this chapter for instructions on how to use those tables.

3.1.3 If a proposed change is not in the examples provided in appendix A, the applicant may use the following steps in conjunction with the flow chart in Figure 3-1 of this GM to develop the appropriate certification basis for the change. For clarification, the change discussed in the flow chart also includes areas affected by the change. See paragraph 3.9.1 of this GM for guidance about affected areas.

Figure 3-1. Developing a Proposed Certification Basis for a Changed Product Pursuant to point 21.A.101



Notes:
1. Changed products that are substantially changed do not follow this flowchart. Refer to 21.A19.
2. Process and propose each applicable standard individually. If Standards are linked together, then they should be assessed together.

3.2. Step 1. Identify the proposed changes to an aeronautical product.

— Identify the type design being changed (the baseline product).

— Identify the proposed change.

— Use high-level descriptors.

3.2.1 **Identify the type design being changed (the baseline product)**.

Prior to describing the proposed change(s), it is important to clearly identify the specific type design configuration being changed.

Note: For additional guidance on the baseline product, see paragraph 5.3 of this GM.

3.2.2 **Identify the proposed change**.

3.2.2.1 The purpose of this process step is to identify and describe the change to the aeronautical product. Changes to a product can include physical design changes and functional changes (e.g. operating envelope or performance changes). An applicant must identify all changes and areas affected by the change, including those where they plan to use previously approved data. EASA considers all of these changes and areas affected by the change to be part of the entire proposed type design and they are considered as a whole in the classification of whether the proposed change is substantial, significant, or not significant. The change can be a single change or a collection of changes. In addition to the proposed changes, an applicant should consider the cumulative effect of previous relevant changes incorporated since the last time the certification basis was upgraded. An applicant for a change must consider all previous relevant changes and the amendment level of the certification specifications in the certification basis used for these changes.

3.2.2.2 When identifying the proposed changes, an applicant should consider previous relevant changes that create a cumulative effect, as these may influence the decisions regarding the classification of the change later in the process. By 'previous relevant changes,' EASA means changes where effects accumulate, such as successive thrust increases, incremental weight increases, or sectional increases in fuselage length. An applicant must account for any previous relevant changes to the area affected by the proposed change that did not involve an upgrade of the certification basis in the proposed change.

3.2.2.3 Example:

An applicant proposes a 5 per cent weight increase, but a previous 4 per cent and another 3 per cent weight increase were incorporated into this aircraft without upgrading the existing certification basis. In the current proposal for a 5 per cent weight increase, the cumulative effects of the two previous weight increases that did not involve an upgrade of the certification basis will now be accounted for as an approximate 12 per cent increase in weight. Note that the cumulative effects the applicant accounts for are only those incremental increases since the last time the airworthiness certification

specifications in the type-certification basis applicable to the area affected by the proposed change were upgraded.

3.2.3 Use High-Level Descriptors.

To identify and describe the proposed changes to any aeronautical product, an applicant should use a high-level description of the change that characterises the intent of, or the reason for, the change. No complex technical details are necessary at this stage. For example, a proposal to increase the maximum passenger-carrying capacity may require an addition of a fuselage plug, and as such, a 'fuselage plug' becomes one possible high-level description of this change. Similarly, a thrust increase, a new or complete interior, an avionics system upgrade, or a passenger-to-cargo conversion are all high-level descriptions that characterise typical changes to the aircraft, each driven by a specific goal, objective, or purpose.

3.2.4 Evolutionary changes that occur during the course of a certification program may require re-evaluation of the certification basis, and those changes that have influence at the product level may result in re-classification of the change.

3.3. Step 2. Verify the proposed change is not substantial.

3.3.1 Point 21.A.19 requires an applicant to apply for a new TC for a changed product if the change to design, power, thrust, or weight is so extensive that a substantially complete investigation of compliance with the applicable regulations is required. A new TC could be required for either a single extensive change to a previously type-certified product or for a changed design derived through the cumulative effect of a series of design changes from a previously type-certified product.

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

3.3.3 If it is not initially clear that a new TC is required, appendix A of this GM provides some examples of substantial changes to aid in this classification. A substantial change requires an application for a new TC. See points 21.B.80, 21.B.82, 21.B.85 and 21.A.19. If the change is not substantial, proceed to step 3.

3.4. Step 3. Will the applicant use the latest standards?

An applicant can use the latest certification specifications for their proposed change and the area affected by the change. If they use the latest certification specifications, they will have met the intent of point 21.A.101 and no further classification (significant or not significant) and justification is needed. Even though an applicant elects to use the latest certification specifications, the applicant will still be able to apply point 21.A.101 for future similar changes, and use the exceptions under point 21.A.101(b). However, the decision to comply with the latest certification specifications sets a new basis for all future related changes to the same affected area for that amended TC.

— If using the latest certification specifications, an applicant should proceed to Step 6 (in paragraph 3.9 of this GM).

— If not using the latest certification specifications, an applicant should proceed to Step 4 below.

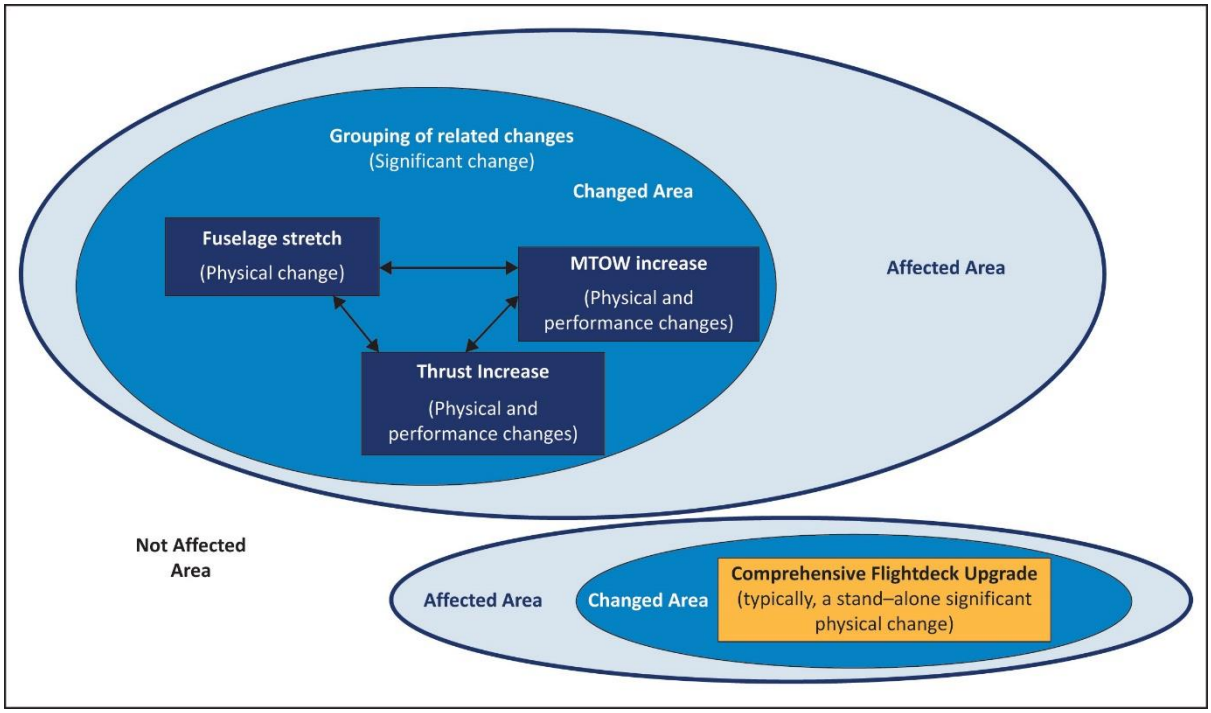
3.5. Step 4. Arrange changes into related and unrelated groups.

3.5.1 An applicant should now determine whether any of the changes identified in Step 1 are related to each other. Related changes are those that cannot exist without another, are co-dependent, or a prerequisite of another. For example, a need to carry more passengers could require the addition of a fuselage plug, which will result in a weight increase, and may necessitate a thrust increase. Thus, the fuselage plug, weight increase, and thrust increase are all related, high-level changes needed to achieve the goal of carrying more passengers. A decision to upgrade the flight deck to more modern avionics at the same time as these other changes may be considered unrelated, as the avionics upgrade is not necessarily needed to carry more passengers (it has a separate purpose, likely just modernisation). The proposed avionics upgrade would then be considered an unrelated (or a stand-alone) change. However, the simultaneous introduction of a new cabin interior is considered related since occupant safety considerations are impacted by a cabin length change. Even if a new cabin interior is not included in the product-level change, the functional effect of the fuselage plug has implications on occupant safety (e.g. the dynamic environment in an emergency landing, emergency evacuation, etc.), and thus the cabin interior becomes an affected area. Figure 3-2 below illustrates the grouping of related and unrelated changes using the example of increasing the maximum number of passengers.

Note: An applicant who plans changes in sequence over time should refer to the discussion on 'sequential design changes' in paragraph 5.13 of this GM.

Figure 3-2. Related and Unrelated Changes for Example of Increasing the Maximum Number of Passengers

The Aeronautical Product



3.5.2 Once the change(s) is (are) organised into groupings of those that are related and those that are unrelated (or stand-alone), an applicant should proceed to Step 5 below.

3.6. Step 5. Is each group of related changes or each unrelated (stand-alone) change a significant change?

3.6.1 The applicant is responsible for proposing the classification of groups of related changes or unrelated changes as 'significant' or 'not significant'. Significant changes are product-level changes that could result from an accumulation of changes, or occur through a single significant change that makes the changed product distinct from its baseline product. The grouping of related and unrelated changes is particularly relevant to EASA's significant Yes/No decision (point 21.A.101(b)(1)) described in Step 1 of Figure 3-1. EASA evaluates each group of related changes and each unrelated (stand-alone) change on its own merit for significance. Thus, there may be as many evaluations for significance as there are groupings of related and unrelated changes. Step 1 of Figure 3-1 explains the accumulation of changes that an applicant must consider. Additionally, point 21.A.101(b)(1) defines a change as 'significant' when at least one of the three automatic criteria applies:

3.6.1.1 Changes where the general configuration is not retained (significant change to general configuration).

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

3.6.1.2 Changes where the principles of construction are not retained (significant change to principles of construction).

A change at the product level to the materials and/or construction methods that affects the overall product's operating characteristics or inherent strength and would require extensive reinvestigation to demonstrate compliance is one where the principles of construction are not retained. For examples, see appendix A of this GM.

3.6.1.3 Product-level changes that invalidate the assumptions used for certification of the baseline product.

Examples include:

— change of an aircraft from an unpressurised to pressurised fuselage,

— change of operation of a fixed-wing aircraft from land-based to water-based, and

— operating envelope expansions that are outside the approved design parameters and capabilities.

For additional examples, see appendix A of this GM.

3.6.2 The above criteria are used to determine whether each change grouping and each stand-alone change is significant. These three criteria are assessed at the product level. In applying the automatic criteria and the examples in appendix A of this GM,

an applicant should focus on the change and how it impacts the existing product (including its performance, operating envelope, etc.). A change cannot be classified or reclassified as a significant change on the basis of the importance of a later amendment.

3.6.3 Appendix A of this GM includes tables of typical changes (examples) for small aeroplanes, transport aeroplanes, rotorcraft, engines, and propellers that meet the criteria for a significant design change. The Appendix also includes tables of typical design changes that EASA classifies as not significant. The tables can be used in one of two ways:

3.6.3.1 To identify the classification of a proposed design change listed in the table, or

3.6.3.2 In conjunction with the three automatic criteria, to help classify a proposed design change not listed in the table by comparison to determinations made for changes with similar type and magnitude.

3.6.4 In many cases, a significant change may involve more than one of these criteria and will be obvious and distinct from other product improvements or production changes. There could be cases where a change to a single area, system, component, or appliance may not result in a product-level change. There could also be other cases where the change to a single system or component might result in a significant change due to its effect on the product overall. Examples may include the addition of winglets or leading-edge slats, or a change to primary flight controls of a fly-by-wire system.

3.6.5 If an unrelated (stand-alone) change or a grouping of related changes is classified as —

Significant (point 21.A.101(a)):

You must comply with the latest airworthiness standards for certification of the change and areas affected by change, unless you justify use of one of the exceptions provided in point 21.A.101(b)(2) or (3) to show compliance with earlier amendment(s). The final certification basis may consist of a combination of the requirements recorded in the certification basis ranging from the original aircraft certification basis to the most current regulatory amendments

Not Significant (point 21.A.101(b)(1)):

You may comply with the existing certification basis unless the standards in the proposed certification basis are deemed inadequate. In cases where the existing certification basis is inadequate or no regulatory standards exist, later requirements and/or special conditions will be required. See paragraph 3.11 of this GM for a detailed discussion.

3.6.6 A new model designation to a changed product is not necessarily indicative that the change is significant under point 21.A.101. Conversely, retaining the existing model designation does not mean that the change is not significant. Significance is determined by the magnitude of the change.

3.6.7 EASA determines the final classification of whether a change is significant or not significant. To assist an applicant in its assessment, EASA has predetermined the classification of several typical changes that an applicant can use for reference, and these examples are listed in appendix A of this GM.

3.6.8 At this point, the determination of significant or not significant for each of the groupings of related changes and each stand-alone change is completed. For significant changes, an applicant that proposes to comply with an earlier certification specification should use the procedure outlined in paragraph 3.7 below. For changes identified as not significant, see paragraph 3.8 below.

3.7. Proposing an amendment level for a significant change.

3.7.1 Without prejudice to the exceptions provided for in point 21.A.101(b) or (c), if the classification of a group of related changes or a stand-alone unrelated change is significant, all areas, systems, components, parts, or appliances affected by the change must comply with the certification specifications at the amendment level in effect on the date of application for the change, unless the applicant elects to comply with certification specifications that have become effective after that date (see point 21.A.101(a)).

3.7.2 In certain cases, an applicant will be required by EASA to comply with certification specifications that have become effective after the date of application (see point 21.A.101(a)):

3.7.2.1 If an applicant elects to comply with a specific certification specification or a subset of certification specifications at an amendment which has become effective after the date of application, the applicant must comply with any other certification specification that EASA finds is directly related (see point 21.A.101(f)).

3.7.2.2 In a case where the change has not been approved, or it is clear that it will not be approved under the time limit established, the applicant will be required to comply with an upgraded certification basis established according to points 21.B.80, 21.B.82 and 21.B.85 from the certification specifications that have become effective since the date of the initial application.

3.7.3 Applicants can justify the use of one of the exceptions in point 21.A.101(b)(2) or (3) to comply with an earlier amendment, but not with an amendment introduced earlier than the existing certification basis. See paragraphs 3.9 and 3.10 of this GM. Applicants who elect to comply with a specific certification specification or a subset of certification specifications at an earlier amendment will be required to comply with any other certification specification that EASA finds are directly related.

3.7.4 The final certification basis may combine the latest, earlier (intermediate), and existing certification specifications, but cannot contain certification specifications preceding the existing certification basis.

3.8. Proposing an amendment level for a not significant change.

3.8.1 When EASA classifies the change as not significant, the point 21.A.101(b) rule allows compliance with earlier amendments, but not prior to the existing certification basis. Within this limit, the applicant may propose an amendment level for each certification specification for the affected area. However, each applicant should be aware that EASA will review their proposals for the certification basis to ensure that the certification basis is adequate for the proposed change under Step 8. (See paragraph 3.11 of this GM.)

3.8.2 Even for a not significant change, an applicant may elect to comply with certification specifications which became applicable after the date of application. Applicants may propose to comply with a specific certification specification or a subset of certification specifications at a certain amendment of their choice. In such a case, any other certification specifications of that amendment that are directly related should be included in the certification basis for the change.

3.9. Step 6. Prepare the proposed certification basis list.

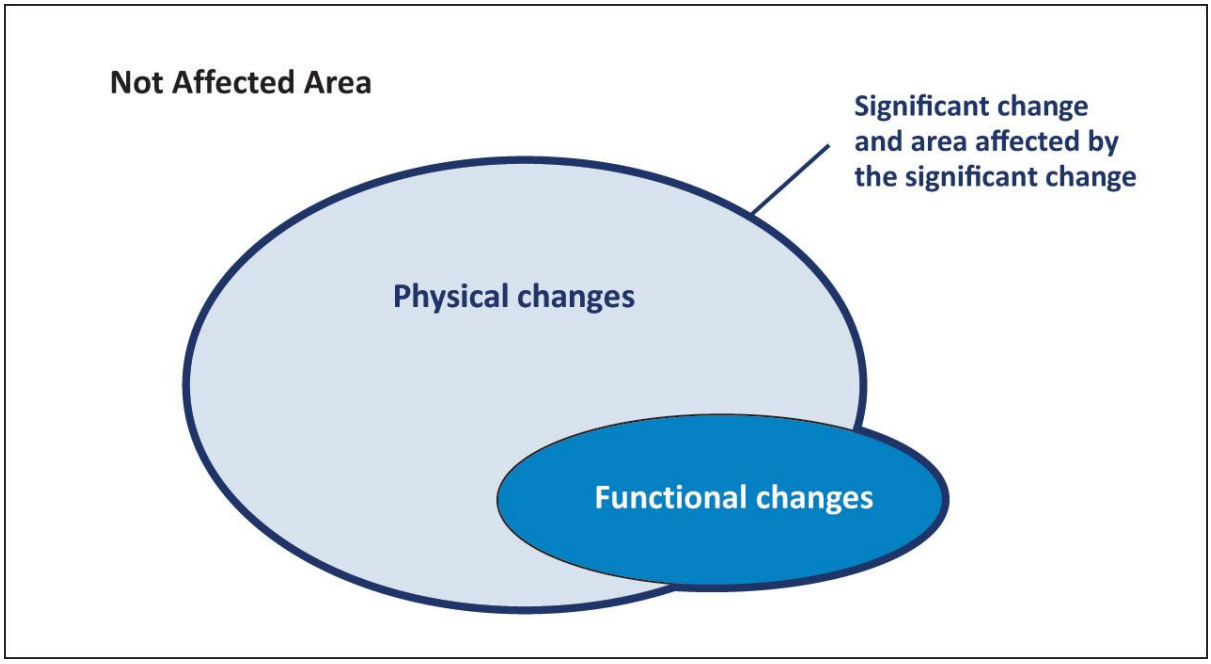
As part of preparing the proposed certification basis list, an applicant must identify any areas, systems, parts or appliances of the product that are affected by the change and the corresponding certification specifications associated with these areas. For each group, the applicant must assess the physical and/or functional effects of the change on any areas, systems, parts or appliances of the product. The characteristics affected by the change are not only physical changes, but also functional changes brought about by the physical changes. Examples of physical aspects are structures, systems, parts and appliances, including software in combination with the affected hardware. Examples of functional characteristics are performance, handling qualities, aeroelastic characteristics, and emergency egress. 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 should be updated or rewritten. Appendix H of this GM contains two examples of how to document a proposed certification basis list.

3.9.1 An area affected by the change is any area, system, component, part, or appliance of the aeronautical product that is physically and/or functionally changed.

3.9.2 Figure 3-33 of this GM illustrates concepts of physical and functional changes of an affected area. Appendix C of this GM contains a method used to define the change and areas affected by the change. This Appendix is meant to assist applicants when they propose large, complex changes. For each change, it is important for the applicant to properly assess the effects of such change on any areas, systems, parts or appliances of the product because areas that have not been physically changed may still be considered part of the affected area. If a new compliance finding is required, regardless of its amendment level, it is an affected area.

Figure 3-3. Affected Areas versus Not Affected Areas

The Aeronautical Product



3.9.3 An area not affected by a change can remain at the existing certification basis, provided that the applicant presents to EASA an acceptable justification that the area is not affected.

3.9.4 For sample questions to assist in determining affected areas, see paragraph D.1 of appendix D of this GM.

3.9.5 Consider the following aspects of a change: **Physical aspects**.

The physical aspects include direct changes to structures, systems, equipment, components, and appliances, and may include software/airborne electronic hardware changes and the resulting effects on systems functions.

3.9.5.1 Performance/functional characteristics.

The less obvious aspect of the word 'areas' covers general characteristics of the type-certified product, such as performance features, handling qualities, emergency egress, structural integrity (including load carrying), aeroelastic characteristics, or crashworthiness. A product-level change may affect these characteristics. For example, adding a fuselage plug could affect performance and handling qualities, and thus the certification specifications associated with these aspects would be considered to be part of the affected area. Another example is the addition of a fuel tank and a new fuel conditioning unit. This change affects the fuel transfer and fuel quantity indication system, resulting in the aircraft's unchanged fuel tanks being affected. Thus, the entire fuel system (changed and unchanged areas) may become part of the affected area due to the change to functional characteristics. Another example is changing turbine engine ratings and operating limitations, affecting the engine rotors' life limits.

3.9.6 All areas affected by the proposed change must comply with the latest certification specifications, unless the applicant shows that demonstrating compliance with the latest amendment of a certification specification would not contribute materially to the level of safety or would be impractical. Step 7 below provides further explanation.

3.9.7 The applicant should document the change and the area affected by the change using high-level descriptors along with the applicable certification specifications and their proposed associated amendment levels. The applicant proposes this change to the certification basis that EASA will consider for documentation in the type certificate data sheet (TCDS) or STC, if they are different from that recorded for the baseline product in the TCDS.

3.10. Step 7. Do the latest standards contribute materially to the level of safety and are they practical?

Pursuant to point 21.A.101(a), compliance with the latest certification specifications is required. However, exceptions may be allowed pursuant to point 21.A.101(b)(3). The applicant must provide justification to support the rationale for the application of earlier amendments for areas affected by a significant change in order to document that compliance with later standards in these areas would not contribute materially to the level of safety or would be impractical. Such a justification should address all the aspects of the area, system, part or appliance affected by the significant change. See paragraphs 3.10.1 and 3.10.1.4 of this GM.

3.10.1 Do the latest standards contribute materially to the level of safety?

Applicants could consider compliance with the latest standards to 'not contribute materially to the level of safety' if the existing type design and/or relevant experience demonstrates a level of safety comparable to that provided by the latest standards. In cases where design features provide a level of safety greater than the existing certification basis, applicants may use acceptable data, such as service experience, to establish the effectiveness of those design features in mitigating the specific hazards by a later amendment. Applicants must provide sufficient justification to allow EASA to make this determination. An acceptable means of compliance is described in appendix E of this GM. Justification is sufficient when it provides a summary of the evaluation that supports the determination using an agreed evaluation method, such as that in appendix E of this GM. This exception could be applicable in the situations described in the paragraphs below.

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

3.10.1.1 Improved design features.

Design features that exceed the existing certification basis standards, but do not meet the latest certification specifications, can be used as a basis for granting an exception under point 21.A.101(b)(3) since complying with the latest amendment of the certification specifications would not contribute materially to the level of safety of the product. If EASA accepts these design features as justification for an exception, the applicant must incorporate them in the amended type design configuration and record them, where necessary, in the certification basis. The description of the design feature

would be provided in the TCDS or STC at a level that allows the design feature to be maintained, but does not contain proprietary information. For example[1], an applicant proposes to install winglets on a Part 25 aeroplane, and part of the design involves adding a small number of new wing fuel tank fasteners. Assuming that the latest applicable amendment of § 25.981 is Amendment 25-102, which requires structural lightning protection, the applicant could propose an exception from these latest structural lightning protection requirements because the design change uses new wing fuel tank fasteners with cap seals installed. The cap seal is a design feature that exceeds the requirement of § 25.981 at a previous amendment level, but does not meet the latest Amendment 25-102. If the applicant can successfully substantiate that compliance with Amendment 25-102 would not materially increase the level of safety of the changed product, then this design feature can be accepted as an exception to compliance with the latest amendment.

3.10.1.2 Consistency of design.

This provision gives the opportunity to consider the consistency of design. For example, when a small fuselage plug is added, additional seats and overhead bins are likely to be installed, and the lower cargo hold extended. These components may be identical to the existing components. The level of safety may not materially increase by applying the latest certification specifications in the area of the fuselage plug. Compliance of the new areas with the existing certification basis may be acceptable.

3.10.1.3 Service experience.

3.10.1.3.1 Relevant service experience, such as experience based on fleet performance or utilisation over time (relevant flight hours or cycles), is one way of showing that the level of safety will not materially increase by applying the latest amendment, so the use of earlier certification specifications could be appropriate. Appendix F of this GM provides additional guidance on the use of service experience, along with examples.

3.10.1.3.2 When establishing the highest practicable level of safety for a changed product, EASA has determined that it is appropriate to assess the service history of a product, as well as the later airworthiness standards. It makes little sense to mandate changes to well-understood designs, whose service experience has been acceptable, merely to comply with new standards. The clear exception to this premise is if the new standards were issued to address a deficiency in the design in question, or if the service experience is not applicable to the new standards.

3.10.1.3.3 There may be cases for rotorcraft and small aeroplanes where relevant data may not be sufficient or not available at all because of the low utilisation and the insufficient amount and type of data available. In such cases, other service history information may provide

[1] This example is taken from the FAA experience gained prior to EASA's start, therefore the references to the FAA sections and amendments are kept.

sufficient data to justify the use of earlier certification specifications, such as: warranty, repair, and parts usage data; accident, incident, and service difficulty reports; service bulletins; airworthiness directives; or other pertinent and sufficient data collected by the manufacturers, authorities, or other entities.

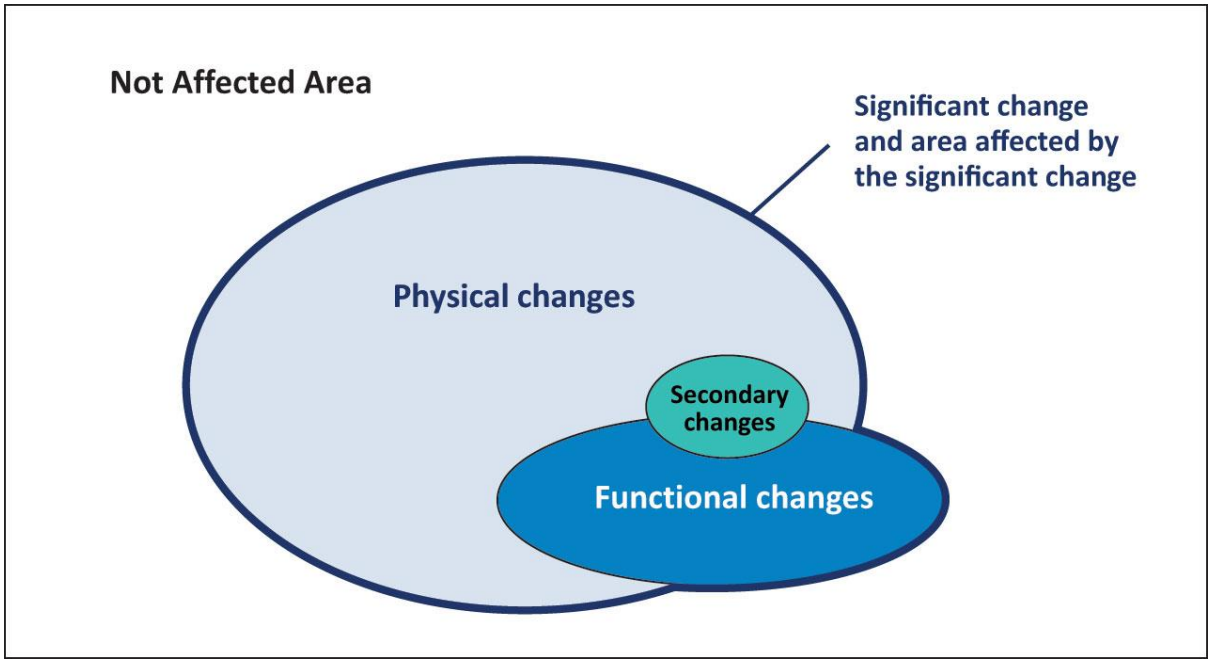
3.10.1.3.4 EASA will determine whether the proposed service experience levels necessary to demonstrate the appropriate level of safety as they relate to the proposed design change are acceptable.

3.10.1.4 Secondary changes.

3.10.1.4.1 The change proposed by the applicant can consist of physical and/or functional changes to the product. See Figure 3-4 below. There may be aspects of the existing type design of the product that the applicant may not be proposing to change directly, but that are affected by the overall change. For example, changing an airframe's structure, such as adding a cargo door in one location, may affect the frame or floor loading in another area. Further, upgrading engines with new performance capabilities could require additional demonstration of compliance for minimum control speeds and aeroplane performance certification specifications. For many years, EASA has required applicants to consider these effects, and this practice is unchanged under the procedures of point 21.A.101.

Figure 3-4. Change-Affected Areas with Secondary Changes

The Aeronautical Product



3.10.1.4.2 For each 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 should be reviewed, updated, or rewritten.

3.10.1.4.3 In assessing the areas affected by the change, it may be helpful to identify secondary changes. A secondary change is a change to physical and/or functional aspects that is part of, but consequential to, a significant physical change, whose only purpose is to restore, and not add or increase, existing functionality or capacity. The term 'consequential' is intended to refer to:

— a change that would not have been made by itself; it achieves no purpose on its own;

— a change that has no effect on the existing functionality or capacity of areas, systems, structures, components, parts, or appliances affected by the change; or

— a change that would not create the need for: (1) new limitations or would affect existing limitations; (2) a new aircraft flight manual (AFM) or instructions for continued airworthiness (ICA) or a change to the AFM or ICA; or (3) special conditions, equivalent safety findings, or deviations.

3.10.1.4.4 A secondary change is not required to comply with the latest certification specifications because it is considered to be 'not contributing materially to the level of safety' and, therefore, eligible for an exception under point 21.A.101. Determining whether a change meets the description for a secondary change, and is 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.

3.10.1.4.5 In some cases, a secondary area of 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.

3.10.2 Are the latest specifications practical?

The intent of point 21.A.101 is to enhance safety by applying the latest certification specifications to the greatest extent practicable. The concepts of contributing materially and practicality are linked. If compliance with the latest certification specifications does contribute materially to the level of safety, then the applicant may assess the incremental costs to see whether they are commensurate with the increase in safety. The additional resource requirements could include those arising from changes required for compliance and the effort required to demonstrate compliance, but excluding resource expenditures for prior product changes. The cost of changing compliance documentation and/or drawings is not an acceptable reason for an exception.

3.10.2.1 Applicants should support their position that compliance is impractical with substantiating data and analyses. While evaluating that position and the substantiating data regarding impracticality, EASA may consider other factors (e.g. the costs and safety benefits for a comparable new design).

3.10.2.2 A review of large aeroplane projects showed that, in certain cases where EASA allowed an earlier amendment of applicable certification specifications, the applicants made changes that nearly complied with the

latest amendments. In these cases, the applicants successfully demonstrated that full compliance would require a substantial increase in the outlay or expenditure of resources with a very small increase in the level of safety. These design features can be used as a basis for granting an exception under point 21.A.101(b)(3) on the basis of 'impracticality.'

3.10.2.3 Appendix E of this GM provides additional guidance and examples for evaluating the impracticality of applying the latest certification specifications to a changed product for which compliance with the latest certification specifications would contribute materially to the level of safety of the product.

3.10.2.3.1 The exception of impracticality is a qualitative and quantitative cost–safety benefit assessment for which it is difficult to specify clear criteria. Experience to date with applicants has shown that a justification of impracticality is more feasible when both the applicant and EASA agree during a discussion at an early stage that the effort (in terms of cost, changes to manufacturing, etc.) required to comply would not be commensurate with a small incremental safety gain. This would be clear even without the need to perform any detailed cost–safety benefit analysis (although an applicant could always use cost analysis to support an appropriate amendment level). However, there should be enough detail in the applicant's rationale to justify the exception.

Note: An applicant should not base an exception due to impracticality on the size of the applicant's company or their financial resources. The applicant must evaluate the costs to comply with a later amendment against the safety benefit of complying with the later amendment.

3.10.2.3.2 For example, a complex redesign of an area of the baseline aircraft may be required to comply with a new requirement, and that redesign may affect the commonality of the changed product with respect to the design and manufacturing processes of the existing family of models. Relevant service experience of the existing fleet of the baseline aircraft family would be required to show that there has not been a history of problems associated with the hazard that the new amendment in question was meant to address. In this way, the incremental cost/impact to the applicant is onerous, and the incremental safety benefit realised by complying with the later amendment would be minimal. This would be justified by demonstrated acceptable service experience in relation to the hazard that the new rule addresses.

3.11. Step 8. Ensure the proposed certification basis is adequate.

EASA considers a proposed certification basis for any change (whether it is significant or not significant) to be adequate when:

— the certification standards provide an appropriate level of safety for the intended change, and

— the change and the areas affected by the change do not result in unsafe design features or characteristics for the intended use.

3.11.1 For a change that contains new design features that are novel and unusual for which there are no later applicable certification specifications at a later amendment level, EASA will designate special conditions pursuant to point 21.B.75. EASA will impose later certification specifications that contain adequate or appropriate safety standards for this feature, if they exist, in lieu of special conditions. An example is adding a flight-critical system, such as an electronic air data display on a CS-25 large aeroplane whose existing certification basis does not cover protection against lightning and high-intensity radiated fields (HIRF). In this case, EASA will require compliance with the certification specifications for lightning and HIRF protection, even though EASA determined that the change is not significant.

3.11.2 For new design features or characteristics that may pose a potential unsafe condition for which there are no later applicable certification specifications, new special conditions may be required to address points 21.B.107(a)(3) or 21.B.111(a)(3).

3.11.3 In cases where inadequate or no standards exist for the change to the existing certification basis, but adequate standards exist in a later amendment of the applicable certification specifications, the later amendment will be made part of the certification basis to ensure the adequacy of the certification basis.

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

4. Excepted Products under point 21.A.101(c)

4.1. Excepted products.

For excepted products as defined in paragraph 4.1.1 below, the starting point for regulatory analysis is the existing certification basis for the baseline product.

4.1.1 Point 21.A.101(c) provides an exception to the compliance with the latest certification specifications required by point 21.A.101(a) for aircraft (other than rotorcraft) of 2 722 kg (6 000 lb) or less maximum weight, or to a non-turbine rotorcraft of 1 361 kg (3 000 lb) 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 certification specifications.

4.1.2 If EASA finds that the change is significant in an area, EASA may require the applicant to comply with a later certification specification and with any certification specification that EASA finds is directly related. Starting with the existing certification basis, EASA will progress through each later certification specification to determine the amendment appropriate for the change. However, if an applicant proposes, and EASA finds, that complying with the later amendment or certification specification would not contribute materially to the level of safety of the changed product or would be impractical, EASA may allow the applicant to comply with an earlier amendment appropriate for the proposed change. The amendment may not be earlier than the existing certification basis. For excepted products, changes that meet one or more of the following criteria, in the area of change, are automatically considered significant:

4.1.2.1 The general configuration or the principles of construction are not retained.

4.1.2.2 The assumptions used for certification of the area to be changed do not remain valid.

4.1.2.3 The change contains new features (not foreseen in the existing certification basis and for which appropriate later certification specifications exist). In this case, EASA will designate the applicable certification specifications, starting with the existing certification basis and progressing to the most appropriate later amendment level for the change.

4.1.2.4 The change contains a novel or unusual design feature. In this case, EASA will designate the applicable special conditions appropriate for the change, pursuant to point 21.A.101(d).

4.1.3 The exception for products under point 21.A.101(c) applies to the aircraft only. Changes to engines and propellers installed on these excepted aircraft are assessed as separate type-certified products using point 21.A.101(a) and (b).

5. Other Considerations

5.1. Design-related requirements from other aviation domains.

Some implementing rules in other aviation domains (air operations, ATM/ANS) (e.g. Commission Regulation (EU) No 965/2012 on air operations or Commission Regulation (EU) 2015/640 on additional airworthiness specifications for a given type of operations (Annex I (Part-26)) impose airworthiness standards that are not required for the issue of a TC or STC (e.g. CS-26, CS-ACNS, etc.). If not already included in the certification basis, any such applicable airworthiness standard may be added to the type certification basis by mutual agreement between the applicant and EASA. The benefit of adding these airworthiness standards to the type certification basis is to increase awareness of these standards, imposed by other implementing rules, during design certification and future modifications to the aircraft. The use of exceptions under point 21.A.101(b) is not intended to alleviate or preclude compliance with operating regulations.

5.2. Reserved.

5.3. Baseline product.

A baseline product consists of one unique type design configuration, an aeronautical product with a specific, defined, approved configuration and certification basis that the applicant proposes to change. As mentioned in paragraph 3.2.1 of this GM, it is important to clearly identify the type design configuration to be changed. EASA does not require an applicant to assign a new model name for a changed product. Therefore, there are vastly different changed products with the same aircraft model name, and there are changed products with minimal differences that have different model names. Since the assignment of a model name is based solely on an applicant's business decision, the identification of the baseline product, for the purposes of point 21.A.101, is, as defined below.

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.

5.4. Predecessor standards.

The certification specifications in effect on the date of application for a change are those in CS-22, CS-23, CS-25, CS-27, CS-29, CS-CCD, CS-FCD, CS-MMEL, etc., issued by EASA after 2003. However, the type-certification basis of some 'grandfathered' products, i.e. those with a pre-EASA TC deemed to have been issued in accordance with Commission Regulation (EU) No 748/2012 (see Article 3), may consist of other standards issued by or recognised in the EU Member States. These standards may include Joint Aviation Requirements (JARs) issued by the Joint Aviation Authorities (JAA) or national regulations of an EU Member State (e.g. BCARs) or national regulations of a non-EU State of Design with which an EU Member State had concluded a bilateral airworthiness agreement (e.g. US FARs, CARs etc.). Consequently, when using one of the exception routes allowing electing to comply with earlier standards, the predecessor standards may be applicable. Such predecessor standards are not recognised under point 21.A.101(a), but may be allowed under point 21.A.101(b) or (c).When choosing the amendment level of a standard, all related standards associated with that amendment level would have to be included.

5.5. Special conditions, point 21.A.101(d).

Point 21.A.101(d) allows for the application of special conditions, or for changes to existing special conditions, to address the changed designs where neither the proposed certification basis nor any later certification specifications provide adequate standards for an area, system, part or appliance related to the change. The objective is to achieve a level of safety consistent with that provided for other areas, systems, parts or appliances affected by the change by the other certification specifications of the proposed certification basis. The application of special conditions to a design change is not, in itself, a reason to classify it as either a substantial change or a significant change. Whether the change is significant, with earlier certification specifications allowed through exceptions, or not significant, the level of safety intended by the special conditions must be consistent with the agreed certification basis.

5.6. Reserved.

5.7. Reserved.

5.8. Reserved.

5.9. Documentation.

5.9.1 Documenting the proposal.

In order to efficiently determine and agree upon a certification basis with EASA, the following information is useful to understand the applicant's position:

— The current certification basis of the product being changed, including the amendment level.

— The amendment level of all the applicable certification specifications at the date of application.

— The proposed certification basis, including the amendment levels.

— Description of the affected area.

— Applicants who propose a certification basis that includes amendment levels earlier than what was in effect at the date of application should include the exception as outlined in point 21.A.101(b) and their justification if needed.

Please see appendix H for examples of optional tools an applicant can use to document your proposed certification basis.

5.9.2 Documenting the significant/not significant decision.

5.9.2.1 EASA determines whether the changes are significant or not significant, and this decision is documented in the Certification Review Item(s). However, EASA provides an optional decision record for the applicant to make a predetermination to facilitate EASA decision. This form is provided in appendix G of this GM and follows the flow chart in Figure 3-1 of this GM. If it is used, the applicant should submit it along with the certification plan.

5.9.2.2 Changes that are determined to be significant changes under point 21.A.101, the exceptions, and the agreement of affected and unaffected areas is typically documented through the Certification Review Item (CRI) A-01 process. An example tool is provided in appendix H of this GM.

5.9.3 Documenting the certification basis.

5.9.3.1 EASA will amend the certification basis for all changes that result in a revision to the product's certification basis on the amended TCDS or STC. In case of a significant change, EASA will document the resulting certification basis in CRI A-01.

5.9.3.2 EASA will document the certification basis of each product model on all STCs, including approved model list STCs.

5.10. Incorporation of STCs into the Type Design.

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.

5.10.1 If the incorporation of the STC(s) does not generate an additional major change, the incorporation is not evaluated pursuant to point 21.A.101. The existing certification basis should be updated to include the later amendments of the STC(s) being incorporated.

5.10.2 If the incorporation of the STC(s) generates an additional major change, the change must be evaluated pursuant to point 21.A.101, and the existing certification basis should be updated to include the amendments resulting from the application of point 21.A.101.

5.11. Removing changes.

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

5.11.1 The applicant should identify a product change that they intend at its inception to be removable as such, and should develop instructions for its removal during the initial certification. EASA will document the certification basis for both the installed and removed configuration separately on the TCDS or STC.

5.11.2 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 changes or portions of those changes may constitute a significant change to type design. A separate STC or an amended TC may be required to remove the modifications and the resulting certification basis established for the changed product.

5.12. The certification basis is part of the change.

A new change may be installed in a product during its production or via a service bulletin or STC. In terms of point 21.A.101, each of the approved changes has its own basis of certification. If an applicant chooses to remove an approved installation (e.g. an interior installation, avionics equipment) and install a new installation, a new certification basis may be required for the new installation, depending on whether the change associated with the new installation is considered significant compared to the baseline configuration that the applicant chooses. If the new installation is a not significant change, the unmodified product's certification basis may be used (not the previous installation certification basis), provided the certification basis is adequate. For example, a large aeroplane is certified in a 'green' configuration. The aeroplane certification basis does not include CS 25.562. An interior is installed under an STC, and the applicant elects to include CS 25.562 (dynamic seats) in the certification basis to meet specific operational requirements. At a later date, the aeroplane is sold to another operator who does not have the same operational requirements. A new interior is installed; there will be no requirement for CS 25.562 to be included in the new certification basis.

5.13. Sequential changes — cumulative effects.

5.13.1 Any applicant who intends to accomplish a product change by incorporating several changes in a sequential manner should identify this to EASA up front when the first application is made. In addition, the cumulative effects arising from the initial change, and from all of the follow-on changes, should be included as part of the description of the change in the initial proposal. The classification of the intended product change will not be evaluated solely on the basis of the first application, but rather on the basis of all the required changes needed to accomplish the intended product change. If EASA determines that the current application is a part of a sequence of related changes, then EASA will re-evaluate the determination of significance and the resulting certification basis as a group of related changes.

5.13.2 Example: Cumulative effects — advancing the certification basis.

The type certificate for aeroplane model X lists three models, namely X-300, X-200, and X-100. The X-300 is derived from the X-200, which is derived from the original X-100 model. An applicant proposes a change to the X-300 aeroplane model. During the review of the X-300 certification basis and the certification specifications affected by the proposed change, it was identified that one certification specification, CS 25.571 (damage tolerance requirements), remained at the same amendment level as the X-100 original certification basis (exception granted on the X-200). Since the amendment level for this particular certification specification was not changed for the two subsequent aeroplane models (X-200 and X-300), the applicant must now examine the cumulative effects of these two previous changes that are related to the proposed change and the damage

tolerance requirements to determine whether the amendment level needs to advance.

Appendix A to GM 21.A.101 Classification of design changes

ED Decision 2017/024/R

The following tables of 'substantial', 'significant', and 'not significant' changes are adopted by the FAA, Agência Nacional de Aviação Civil (ANAC), the European Aviation Safety Agency (EASA), and Transport Canada Civil Aviation (TCCA) through international collaboration. The classification may change due to cumulative effects and/or combinations of individual changes.

A.1 Examples of Substantial, Significant, and Not Significant Changes for Small Aeroplanes (CS-23).

A.1.1 Table A-1 contains examples of changes that are 'substantial' for small aeroplanes (CS-23).

Table A-1. Examples of Substantial Changes for Small Aeroplanes (CS-23)

Example	Description of Change	Notes
1.	Change to wing location (tandem, forward, canard, high/low).	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
2.	Fixed wing to tilt wing.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
3.	A change to the number of engines.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
4.	Replacement of piston or turboprop engines with turbojet or turbofan engines.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
5.	Change to engine configuration (tractor/pusher).	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
6.	Increase from subsonic to supersonic flight regime.	
7.	Change from an all-metal to all-composite aeroplane.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
8.	Certifying a CS-23 (or predecessor basis, such as JAR-23) aeroplane into another certification category, such as CS-25.	—

A.1.2 Table A-2 contains examples of changes that are 'significant' for small aeroplanes (CS-23).

Table A-2. Examples of Significant Changes for Small Aeroplanes (CS-23)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
1.	Conventional tail to T-tail or V-tail, or vice versa.	Yes	No	Yes	Change to general configuration. Requires extensive, structural flying qualities and performance reinvestigation. Requires new aeroplane flight manual (AFM) to address performance and flight characteristics.
2.	Changes to wing configuration, such as change to dihedral, changes to wing span, flap or aileron span, addition of winglets, or increase of more than 10 per cent of the original wing sweep at the quarter chord.	Yes	No	Yes	Change to general configuration. Likely requires extensive changes to wing structure. Requires new AFM to address performance and flight characteristics. Note: Small changes to the wingtip or winglet are not significant changes. See table for 'not significant' changes.
3.	Changes to tail configuration, such as the addition of tail strakes or angle of incidence of the tail.	Yes	No	Yes	Change to general configuration. Likely requires extensive changes to tail structure. Requires new AFM to address performance and flight characteristics. Note: Small changes to tail are not significant changes.
4.	Tricycle/tail wheel undercarriage change or addition of floats.	Yes	No	No	Change to general configuration. Likely, at aeroplane level, general configuration and certification assumptions remain valid.
5.	Passenger-to-freighter configuration conversion that involves the introduction of a cargo door or an increase in floor loading of more than 20 per cent, or provision for carriage of passengers and freight together.	Yes	No	Yes	Change to general configuration affecting load paths, aeroelastic characteristics, aircraft-related systems, etc. Change to design assumptions.
6.	Replace reciprocating engines with the same number of turbo-propeller engines.	Yes	No	No	Requires extensive changes to airframe structure, addition of aircraft systems, and new AFM to address performance and flight characteristics.
7.	Addition of a turbo-charger that changes the power envelope, operating range, or limitations.	No	No	Yes	Invalidates certification assumptions due to changes to operating envelope and limitations. Requires new AFM to address performance and flight characteristics.

Table A-2. Examples of Significant Changes for Small Aeroplanes (CS-23)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
8.	The replacement of an engine of higher rated power or increase thrust would be considered significant if it would invalidate the existing substantiation, or would change the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the assumptions of certification.	No	Yes	Yes	Invalidates certification assumptions. Requires new AFM to address performance and flight characteristics. Likely changes to primary structure. Requires extensive construction reinvestigation.
9.	A change to the type of material, such as composites in place of metal, or one composite fibre material system with another (e.g. carbon for fiberglass), for primary structure would normally be assessed as a significant change.	No	Yes	Yes	Change to principles of construction and design from conventional practices. Likely change to design/certification assumptions.
10.	10. A change involving appreciable increase in design speeds V^D, V^B, V^{MO}, V^C, or V^A.	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.
11.	Installation of a short take-off and landing (STOL) kit.	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.
12.	A change to the rated power or thrust could be a significant change if the applicant is taking credit for increased design speeds per example 10 of this table.	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.
13.	Fuel state, such as compressed gaseous fuels or fuel cells. This could completely alter the fuel storage and handling systems and possibly affect the aeroplane structure.	No	No	Yes	Changes to design/certification assumptions. Extensive alteration of fuel storage and handling systems.
14.	A change to the flight control concept for an aircraft, e.g. to fly-by-wire (FBW) and side-stick control, or a change from hydraulic to electronically actuated flight controls, would in isolation normally be regarded as a significant change.	No	No	Yes	Changes to design and certification assumptions. Requires extensive systems architecture and integration reinvestigation. Requires new AFM.

Table A-2. Examples of Significant Changes for Small Aeroplanes (CS-23)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
15.	Change to aeroplane's operating altitude, or cabin operating pressure greater than 10 per cent in maximum cabin pressure differential.	No	No	Yes	This typically invalidates certification assumptions and the fundamental approach used in decompression, structural strength, and fatigue. May require extensive airframe changes affecting load paths, fatigue evaluation, aeroelastic characteristics, etc. Invalidates design assumptions.
16.	Addition of a cabin pressurisation system.	No	Yes	Yes	Extensive airframe changes affecting load paths, fatigue evaluation, aeroelastic characteristics, etc. Invalidates design assumptions.
17.	Changes to types and number of emergency exits or an increase in maximum certified passenger capacity.	Yes	No	Yes	Emergency egress certification specifications exceed those previously substantiated. Invalidates assumptions of certification.
18.	A change to the required number of flight crew that necessitates a complete flight deck rearrangement, and/or an increase in pilot workload.	No	No	Yes	Extensive changes to avionics and aircraft systems. Invalidates certification assumptions. Requires new AFM.
19.	Expansion of an aircraft's operating envelope.*	No	No	Yes* *Some changes may be deemed 'not significant' depending on the extent of the expansion.	An expansion of operating capability is a significant change (e.g. an increase in maximum altitude limitation, approval for flight in icing conditions, or an increase in airspeed limitations).
20.	Replacement of an aviation gasoline engine with an engine of approximately the same horsepower utilising, e.g. diesel, hybrid, or electrical power.	No	No	Yes	A major change to the aeroplane. The general configuration and principles of construction will usually remain valid; however, the assumptions for certification are invalidated.
21.	Comprehensive flight deck upgrade, such as conversion from entirely federated, independent electromechanical flight instruments to highly integrated and combined electronic display systems with extensive use of software and/or complex electronic hardware.	No	No	Yes	Affects avionics and electrical systems integration and architecture concepts and philosophies. This drives a reassessment of the human–machine interface, flight-crew workload, and re-evaluation of the original design flight deck assumptions.
22.	Introduction of autoland.	No	No	Yes	Invalidates original design assumptions.

Table A-2. Examples of Significant Changes for Small Aeroplanes (CS-23)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
23.	Conversion from a safe life design to a damage-tolerance-based design.	No	No	Yes	Where the airframe-established safe life limits change to damage-tolerance principles, then use of an inspection program in lieu of the safe life design limit invalidates the original assumptions used during certification.
24.	Extensive structural airframe modification, such as a large opening in the fuselage.	Yes	No	No	Requires extensive changes to fuselage structure, affects aircraft systems, and requires a new AFM to address performance and flight characteristics.
25.	Fuselage stretch or shortening in the cabin or pressure vessel.	Yes	No	Yes	Cabin interior changes are related changes since occupant safety considerations are impacted by a cabin length change. Even if a new cabin interior is not included in the product-level change, the functional effect of the fuselage plug has implications on occupant safety (e.g. the dynamic environment in an emergency landing, emergency evacuation, etc.), and thus the cabin interior becomes an affected area.
26.	Conversion from normal category to commuter category aeroplane.	Yes	No	Yes	Requires compliance with all commuter regulatory standards. In many cases, this change could be considered a substantial change to the type design. Therefore, a proposed change of this nature would be subject to EASA determination under 21.A.19.
27.	Installation of a full authority digital engine control (FADEC) on an aeroplane that did not previously have a FADEC installed.	No	No	Yes	—

A.1.3 Table A-3 contains examples of changes that are 'not significant' for small aeroplanes (CS-23).

Table A-3. Examples of Not Significant Changes for Small Aeroplanes (CS-23)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
1.	Addition of wingtip modifications (not winglets).	No	No	No	A major change to the aeroplane. Likely, the original general configuration, principles of construction, and certification assumptions remain valid.
2.	Installation of skis or wheel skis.	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.
3.	Forward looking infrared (FLIR) or surveillance camera installation.	No	No	No	Additional flight or structural evaluation may be necessary, but the change does not alter basic aeroplane certification.
4.	Litter, berth, and cargo tie down device installation.	No	No	No	Not an aeroplane-level change.
5.	Not an aeroplane-level change.	No	No	No	Not an aeroplane-level change.
6.	Replacement of one propeller type with another (irrespective of increase in number of blades).	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.
7.	Addition of a turbo-charger that does not change the power envelope, operating range, or limitations (e.g. a turbo-normalised engine, where the additional power is used to enhance high-altitude or hot-day performance).	No	No	No	Not an aeroplane-level change.
8.	Substitution of one method of bonding for another (e.g. change to type of adhesive).	No	No	No	Not an aeroplane-level change.
9.	Substitution of one type of metal for another.	No	No	No	Not an aeroplane-level change.

Table A-3. Examples of Not Significant Changes for Small Aeroplanes (CS-23)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
10.	Any change to construction or fastening not involving primary structure.	No	No	No	Not an aeroplane-level change.
11.	A new fabric type for fabric-skinned aircraft.	No	No	No	Not an aeroplane-level change.
12.	Increase in flap speed or undercarriage limit speed.	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.
13.	Structural strength increases.	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.
14.	Instrument flight rules (IFR) upgrades involving installation of components (where the original certification does not indicate that the aeroplane is not suitable as an IFR platform, e.g. special handling concerns).	No	No	No	Not an aeroplane-level change.
15.	Fuel tanks where fuel is changed from gasoline to diesel fuel and tank support loads are small enough that an extrapolation from the previous analysis would be valid. Chemical compatibility would have to be substantiated.	No	No	No	Not an aeroplane-level change.
16.	Limited changes to a pressurisation system, e.g. number of outflow valves, type of controller, or size of pressurised compartment, but the system must be re-substantiated if the original test data are invalidated.	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.

Table A-3. Examples of Not Significant Changes for Small Aeroplanes (CS-23)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
17.	Install a different exhaust system.	No	No	No	Not an aeroplane-level change.
18.	Changes to engine cooling or cowling.	No	No	No	Not an aeroplane-level change.
19.	Changing fuels of substantially the same type, such as AvGas to AutoGas, AvGas (80/87) to AvGas (100LL), ethanol to isopropyl alcohol, Jet B to Jet A.	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.
20.	Fuels that specify different levels of 'conventional' fuel additives that do not change the primary fuel type. Different additive levels (controlled) of MTBE, ETBE, ethanol, amines, etc., in AvGas would not be considered a significant change.	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.
21.	A change to the maximum take-off weight of less than 5 per cent, unless assumptions made in justification of the design are thereby invalidated.	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.
22.	An additional aileron tab (e.g. on the other wing).	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.
23.	Larger diameter flight control cables with no change to routing, or other system design.	No	No	No	Not an aeroplane-level change.
24.	Autopilot installation (for IFR use, unless the original certification indicates that the aeroplane is not suitable as an IFR platform).	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid.

Table A-3. Examples of Not Significant Changes for Small Aeroplanes (CS-23)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
25.	Increased battery capacity or relocate battery.	No	No	No	Not an aeroplane-level change.
26.	Replace generator with alternator.	No	No	No	Not an aeroplane-level change.
27.	Additional lighting (e.g. navigation lights, strobes).	No	No	No	Not an aeroplane-level change.
28.	Higher capacity brake assemblies.	No	No	No	Not an aeroplane-level change.
29.	Increase in fuel tank capacity.	No	No	No	Not an aeroplane-level change.
30.	Addition of an oxygen system.	No	No	No	Not an aeroplane-level change.
31.	Relocation of a galley.	No	No	No	Not an aeroplane-level change.
32.	Passenger-to-freight (only) conversion with no change to basic fuselage structure.	No	No	No	Although a major change to the aeroplane, likely the original general configuration, principles of construction, and certification assumptions remain valid. Requires certification substantiation applicable to freighter certification specifications.
33.	New cabin interior with no fuselage length change.	No	No	No	—
34.	Installation of new seat belt or shoulder harness.	No	No	No	Not an aeroplane-level change.
35.	A small increase in centre of gravity (CG) range.	No	No	No	At aeroplane level, no change to general configuration, principles of construction, and certification assumptions.
36.	Auxiliary power unit (APU) installation that is not flight-essential.	No	No	No	Although a major change to the aeroplane level, likely the original general configuration, principles of construction, and certification assumptions remain valid. Requires certification substantiation applicable to APU installation certification specifications.
37.	An alternative autopilot.	No	No	No	Not an aeroplane-level change.

Table A-3. Examples of Not Significant Changes for Small Aeroplanes (CS-23)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
38.	Addition of Class B terrain awareness and warning system (TAWS).	No	No	No	Not an aeroplane-level change.
39.	Extending an established life limit.	No	No	No	This extension may be accomplished by various methods, such as ongoing fatigue testing, service life evaluation, component level replacement, and inspections based on damage-tolerance principles.
40.	Flight deck replacement of highly integrated and combined electronic display systems with other highly integrated and combined electronic display systems.	No	No	No	Not significant if the architecture concepts, design philosophies, human–machine interface, or flight-crew workload assumptions are not impacted.
41.	Interior cabin reconfigurations are generally considered not significant. This includes installation of in-flight entertainment (IFE), new seats, and rearrangement of furniture.	No	No	No	—
42.	Modification to ice protection systems.	No	No	No	Recertification required, but certification basis should be evaluated for adequacy.

A.2 Examples of Substantial, Significant, and Not Significant Changes for Large Aeroplanes (CS-25).

A.2.1 Table A-4 contains examples of changes that are 'substantial' for large aeroplanes (CS-25).

Table A-4. Examples of Substantial Changes for Large Aeroplanes (CS-25)

Example	Description of Change	Notes
1.	Change to the number or location of engines, e.g. four to two wing-mounted engines or two wing-mounted to two body-mounted engines.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
2.	Change from a high-wing to low-wing configuration.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
3.	Change from an all-metal to all-composite aeroplane.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
4.	Change of empennage configuration for larger aeroplanes (cruciform vs 'T' or 'V' tail).	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
5.	Increase from subsonic to supersonic flight regime.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.

A.2.2 Table A-5 contains examples of changes that are 'significant' for large aeroplanes (CS-25).

Table A-5. Examples of Significant Changes for Transport Large Aeroplanes (CS-25)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
1.	Reduction in the number of flight crew (in conjunction with flight deck update).	No	No	Yes	Extensive changes to avionics and aircraft systems. Impact to flight-crew workload and human factors, pilot type rating.
2.	Modify an aeroplane to add certification for flight in icing conditions by adding systems, such as ice detection and ice protection.	Yes	No	Yes	New aircraft operating envelope. Requires major new systems installation and aircraft evaluation. Operating envelope changed.
3.	Conversion — passenger or combination freighter/passenger to all-freighter, including cargo door, redesign floor structure and 9g net or rigid barrier.	Yes	No	Yes	Extensive airframe changes affecting load paths, aeroelastic characteristics, aircraft-related systems for fire protection, etc. Design assumptions changed from passenger to freighter.
4.	Conversion from a cargo to passenger configuration.	Yes	No	Yes	Completely new floor loading and design. Redistribution of internal loads, change to cabin safety certification specifications, system changes.

Table A-5. Examples of Significant Changes for Transport Large Aeroplanes (CS-25)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
5.	Increase in cabin pressurisation greater than 10 per cent.	No	No	Yes	A change greater than 10 per cent in operational cabin pressure differential is a significant change since it requires extensive airframe changes affecting load paths, fatigue evaluation, or aeroelastic characteristics, invalidating the certification assumptions.
6.	Addition of leading-edge slats.	Yes	No	Yes	The addition of leading-edge slats is significant since it requires extensive changes to wing structure, adds aircraft systems, and requires a new AFM to address performance and flight characteristics.
7.	Fuselage stretch or shortening in the cabin or pressure vessel.	Yes	No	Yes	Cabin interior changes are related changes since occupant safety considerations are impacted by a cabin length change. Even if a new cabin interior is not included in the product-level change, the functional effect of the fuselage plug has implications on occupant safety (e.g. the dynamic environment in an emergency landing, emergency evacuation, etc.), and thus the cabin interior becomes an affected area.
8.	Extensive structural airframe modification, such as installation of a large telescope with large opening in the fuselage.	Yes	No	No	These types of structural modifications are significant since they require extensive changes to fuselage structure, affect aircraft systems, and require a new AFM to address performance and flight characteristics.
9.	Changing the number of axles or number of landing gear done in context with a product change that involves changing the aeroplane's gross weight.	Yes	No	No	This type of landing gear change with an increase in gross weight is significant since it requires changes to aircraft structure, affects aircraft systems, and requires AFM changes, which invalidate the certification assumptions.

Table A-5. Examples of Significant Changes for Transport Large Aeroplanes (CS-25)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
10.	Primary structure changes from metallic material to composite material.	No	Yes	No	Change to principles of construction and design from conventional practices.
11.	An increase in design weight of more than 10 per cent.	No	No	Yes	Design weight increases of more than 10 per cent result in significant design load increase that invalidates the assumptions used for certification, requiring re-substantiation of aircraft structure, aircraft performance, and flying qualities and associated systems.
12.	Installation of winglets, modification of existing winglets, or other changes to wing tip design.	Yes	No	Yes	Significant if it requires extensive changes to wing structure or aircraft systems, or if it requires a new AFM to address performance and flight characteristics. It may also affect the wing fuel tanks, including fuel tank lightning protection, fuel tank ignition source prevention, and fuel tank flammability exposure.
13.	Changes to wing span, chord, or sweep.	Yes	No	Yes	Significant if it requires extensive changes to wing structure or aircraft systems, or if it requires a new AFM to address performance and flight characteristics. It may also affect the wing fuel tanks, including fuel tank lightning protection, fuel tank ignition source prevention, and fuel tank flammability exposure.
14.	A change to the type or number of emergency exits or an increase in the maximum certified number of passengers.	Yes	No	Yes	—
15.	A comprehensive avionics upgrade that changes a federated avionics system to a highly integrated avionics system.	No	No	Yes	This change refers to the avionics system that feeds the output to displays and not the displays themselves.

Table A-5. Examples of Significant Changes for Transport Large Aeroplanes (CS-25)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
16.	An avionics upgrade that changes the method of input from the flight crew, which was not contemplated during the original certification.	No	No	Yes	A change that includes touchscreen technology typically does not invalidate the assumptions used for certification. A change that incorporates voice-activated controls or other novel human–machine interface would likely invalidate the assumptions used for certification.
17.	Change to primary flight controls to FBW system. (Some aeroplanes have some degree of FBW. Achieving full FBW may be a not significant change on some aeroplanes.)	No	No	Yes	When the degree of change is so extensive that it affects basic aircraft systems integration and architecture concepts and philosophies. This drives a complete reassessment of flight-crew workload, handling qualities, and performance evaluation, which are different from the original design assumptions.
18.	Replace reciprocating with turbo-propeller engines.	Yes	No	No	Requires extensive changes to airframe structure, addition of aircraft systems, and new AFM to address performance and flight characteristics.
19.	Maximum continuous or take-off thrust or power increase of more than 10 per cent or, for turbofans, an increase of the nacelle diameter.	No	No	Yes	A thrust or power increase of more than 10 per cent is significant because it does have a marked effect on aircraft performance and flying qualities, or requires re-substantiation of powerplant installation. An increase of the nacelle diameter as a result of an increase in the bypass ratio is significant because it results in airframe-level effects on aircraft performance and flying qualities. However, a small increase of the nacelle diameter would not have such an airframe-level effect and would not be considered a significant change.

Table A-5. Examples of Significant Changes for Transport Large Aeroplanes (CS-25)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
20.	Initial installation of an autoland system.	No	No	Yes	Baseline aeroplane not designed for autoland operation, potential flight-crew workload, and systems compatibility issues.
21.	Installation of a new fuel tank, e.g. installation of an auxiliary fuel tank in a cargo bay or installation of an auxiliary fuel tank that converts a dry bay into a fuel tank (such as a horizontal stabiliser tank).	No	No	Yes	Requires changes to airframe, systems, and AFM. Results in performance changes. These changes typically affect fuel tank lightning protection, fuel tank ignition source prevention, and fuel tank flammability exposure.
22.	Main deck cargo door installation.	Yes	No	No	Redistribution of internal loads, change to aeroelastic characteristics, system changes.
23.	Expansion of an aircraft's operating envelope.*	No	No	Yes* *Some changes may be deemed 'not significant' depending on the extent of the expansion.	An expansion of operating capability is a significant change (e.g. an increase in maximum altitude limitation, approval for flight in icing conditions, or an increase in airspeed limitations).
24.	Changing the floor from passenger-carrying to cargo-carrying capability.	Yes	No	Yes	Completely new floor loading and design. Redistribution of internal loads, change to cabin safety certification specifications, system changes. If a cargo handling system is installed, it would be a related change.
25.	Initial installation of an APU essential for aircraft flight operation.	No	No	Yes	Changes to emergency electrical power certification specifications, change to aircraft flight manual and operating characteristics.
26.	Conversion from hydraulically actuated brakes to electrically actuated brakes.	No	No	Yes	Assumptions of certification for aeroplane performance are changed.
27.	Installation of engine thrust reversers.	Yes	No	Yes	

Table A-5. Examples of Significant Changes for Transport Large Aeroplanes (CS-25)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
28.	Request for extended-range operations (ETOPS) type design approval for: (a) aeroplanes without an existing ETOPS type design approval, and (b) extension of an aeroplane's diversion time.	No	No	Yes	An expansion of diversion capability for ETOPS would normally be a significant change. However, expanding the diversion capability for which it was originally designed is generally not a significant change. In this case, the assumptions used for certification of the basic product remain valid, and the results can be applied to cover the changed product with predictable effects or can be demonstrated without significant physical changes to the product.
29.	Installation of an engine with a FADEC on an aeroplane that did not previously have a FADEC engine installed.	No	No	Yes	A change from a mechanical control engine to a FADEC engine may be so extensive that it affects basic aircraft systems integration and architecture concepts and philosophies. This drives a complete reassessment of flight-crew workload, handling qualities, and performance evaluation, which are different from the original design assumptions.

A.2.3 Table A-6 contains examples of changes that are 'not significant' for large aeroplanes (CS-25).

Table A-6. Examples of Not Significant Changes for Large Aeroplanes (CS-25)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
1.	Alternate engine installation or hush kit at same position.	No	No	No	It is not significant so long as there is less than a 10 per cent increase in thrust or there is not a change to the principles of propulsion. A change to position to accommodate a different engine size could influence aeroplane performance and handling qualities and result in a significant change.
2.	A small change to fuselage length due to re-fairing the aft body or radome.	No	No	No	For cruise performance reasons, where such changes do not require extensive structural, systems, aerodynamic, or AFM changes.
3.	Re-fairing of wing tip caps (for lights, fuel dump pipes) and addition of splitter plates to the trailing edge thickness of the cruise aerofoil.	No	No	No	Does not require extensive structural, AFM, or systems changes.
4.	Additional power used to enhance high-altitude or hot-day performance.	No	No	No	Usually no change to basic operating envelope. Existing certification data can be extrapolated. Could be significant product change if the additional power is provided by installation of a rocket motor or additional, on demand engine due to changes to certification assumptions.
5.	Installation of an autopilot system.	No	N/A	See notes	It may be possible that the modification is adaptive in nature, with no change to original certification assumptions. However, in certain cases the installation of an autopilot may include extensive changes and design features that change both the general configuration and the assumptions for certification (i.e. installation of the autopilot may introduce a number of additional mechanical and electronic failure modes and change the hazard classification of given aircraft-level failures).

Table A-6. Examples of Not Significant Changes for Large Aeroplanes (CS-25)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
6.	Change from assembled primary structure to monolithic or integrally machined structure.	No	No	No	Method of construction must be well understood.
7.	Modification to ice protection systems.	No	No	No	Recertification required, but certification basis is adequate.
8.	Brakes: design or material change, e.g. steel to carbon.	No	No	No	Recertification required, but certification basis is adequate.
9.	Redesign floor structure.	No	No	No	By itself, not a significant product change. It is significant if part of a cargo conversion of a passenger aeroplane.
10.	New cabin interior with no fuselage length change.	No	No	No	A new cabin interior includes new ceiling and sidewall panels, stowage, galleys, lavatories, and seats. Novel or unusual design features in the cabin interior may require special conditions. Many interior-related certification specifications are incorporated in operational rules. Even though the design approval holder may not be required to comply with these certification specifications, the operator may be required to comply.
11.	A rearrangement of an interior (e.g. seats, galleys, lavatories, closets, etc.).	No	No	No	—
12.	Novel or unusual method of construction of a component.	No	No	No	The component change does not rise to the product level. Special conditions could be required if there are no existing certification specifications that adequately address these features.

Table A-6. Examples of Not Significant Changes for Large Aeroplanes (CS-25)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
13.	Initial installation of a non-essential APU.	No	No	No	A stand-alone initial APU installation on an aeroplane originally designed to use ground- or airport-supplied electricity and air conditioning. In this case, the APU would be an option to be independent of airport power.
14.	Increasing the life limit as CS 25.571 fatigue testing progresses for a recently type-certified aeroplane.	No	No	No	For example, a recently type-certified aeroplane may undergo fatigue testing as part of compliance with CS 25.571. In this case, the TC holder may specify an initial life limit in the airworthiness limitations section (ALS) and gradually increase that life limit as fatigue testing progresses. Such change to the ALS is considered not significant.
15.	Extending limit of validity (LOV)	No	No	No	Extending an LOV without any other change to the aeroplane is not a significant change. However, if extending the LOV requires a physical design change to the aeroplane, the design change is evaluated to determine the level of significance of the design change.
16.	Airframe life extension.	No	No	No	This does not include changes that involve changes to design loads, such as pressurisation or weight increases. Also, this does not include changing from safe life to damage tolerance.
17.	Changes to the type or number of emergency exits by de-rating doors or deactivating doors with corresponding reduction in passenger capacity.	No	No	No	The new emergency egress does not exceed that previously substantiated because the certified number of passengers is reduced.

Table A-6. Examples of Not Significant Changes for Large Aeroplanes (CS-25)					
Example	**Description of change**	**Is there a change to the general configuration? 21.A.101(b)(1)(i)**	**Is there a change to the principles of construction? 21.A.101(b)(1)(i)**	**Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)**	**Notes**
18.	Request for ETOPS type design approval for a type design change of a product with an existing ETOPS type design approval.	No	No	No	A change to a product with an existing ETOPS type design approval without a change to diversion capability would normally not be significant. However, if the existing ETOPS type design approval was based on policy prior to the adoption of transport category ETOPS airworthiness standards, then there is not an adequate certification basis to evaluate the type design change for ETOPS. In this case, the change is still not significant, and the appropriate transport category ETOPS airworthiness standards would apply.
19.	An avionics change from federated electromechanical displays to federated electronic displays.	No	No	No	Changing an electromechanical display to an electronic display is not considered significant.
20.	An avionics change replacing an integrated avionics system with another integrated avionics system.	No	No	No	The assumptions used to certify a highly integrated avionics system should be the same for another highly integrated avionics system.

A.3 Examples of Substantial, Significant, and Not Significant Changes for Rotorcraft (CS-27 and CS-29).

A.3.1 Table A-7 contains examples of changes that are 'substantial' for rotorcraft (CS-27 and CS-29).

Table A-7. Examples of Substantial Changes for Rotorcraft (CS-27 and 29)

Example	Description of Change	Notes
1.	Change from the number and/or configuration of rotors (e.g. main & tail rotor system to two main rotors).	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
2.	Change from an all-metal rotorcraft to all-composite rotorcraft.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.

A.3.2 Table A-8 contains examples of changes that are 'significant' for rotorcraft (CS-27 and CS-29).

Table A-8. Examples of Significant Changes for Rotorcraft (CS-27 and CS-29)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
1.	Comprehensive flight deck upgrade, such as conversion from entirely federated, independent electromechanical flight instruments to highly integrated and combined electronic display systems with extensive use of software and/or complex electronic hardware.	No	No	Yes	Affects avionics and electrical systems integration and architecture concepts and philosophies. This drives a reassessment of the human–machine interface, flight-crew workload, and re-evaluation of the original design flight deck assumptions.
2.	Certification for flight into known icing conditions.	No	No	Yes	
3.	(Fixed) flying controls from mechanical to fly-by-wire.	No	No	Yes	This drives a complete reassessment of the rotorcraft controllability and flight control failure.
4.	Addition of an engine; e.g. from single to twin or reduction of the number of engines; e.g. from twin to single.	Yes	Yes	Yes	—
5.	A change of the rotor drive primary gearbox from a splash-type lubrication system to a pressure-lubricated system due to an increase in horsepower of an engine or changing from a piston engine to turbine engine.	No	Yes	Yes	—

Table A-8. Examples of Significant Changes for Rotorcraft (CS-27 and CS-29)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
6.	A fuselage or tail boom modification that changes the primary structure, aerodynamics, and operating envelope sufficiently to invalidate the certification assumptions.	Yes	No	Yes	—
7.	Application of an approved primary structure to a different approved model (e.g. installation on a former model of a main rotor that has been approved on a new model, and that results in increased performance).	No	Yes	Yes	—
8.	Emergency medical service (EMS) configuration with primary structural changes sufficient to invalidate the certification assumptions.	No	No	Yes	Many EMS configurations will not be classified as significant. Modifications made for EMS are typically internal, and the general external configuration is normally not affected. These changes should not automatically be classified as significant. Note: Door addition or enlargement involving structural change would be significant.
9.	Skid landing gear to wheel landing gear or wheel landing to skid.	Yes	No	Yes	—
10.	Change of the number of rotor blades.	Yes	No	Yes	—
11.	Change of tail anti-torque device (e.g. tail rotor, ducted fan, or other technology).	Yes	Yes	No	—
12.	Passenger-configured helicopter to a firefighting-equipment-configured helicopter.	Yes	No	Yes	Depends on the firefighting configuration.
13.	Passenger-configured helicopter to an agricultural-configured helicopter.	Yes	No	Yes	Depends on the agricultural configuration.
14.	An initial Category A certification approval to an existing configuration.	No	No	Yes	—
15.	IFR upgrades involving installation of upgraded components for new IFR configuration.	No	No	Yes	Changes to architecture concepts, design philosophies, human-machine interface, or flight-crew workload.

Table A-8. Examples of Significant Changes for Rotorcraft (CS-27 and CS-29)					
Example	**Description of change**	**Is there a change to the general configuration? 21.A.101(b)(1)(i)**	**Is there a change to the principles of construction? 21.A.101(b)(1)(i)**	**Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)**	**Notes**
16.	Human external cargo (HEC) certification approval.	No	No	Yes	Must comply with the latest HEC certification specifications in order to obtain operational approval. Assumptions used for certification are considered invalidated when this leads to a significant re-evaluation, for example, of fatigue, quick-release systems, HIRF, one-engine-inoperative (OEI) performance, and OEI procedures.
17.	Reducing the number of pilots for IFR from two to one.	No	No	Yes	—
18.	An avionics upgrade that changes a federated avionics system to a highly integrated avionics system.	No	No	Yes	This change refers to the avionics system that feeds the output to displays and not the displays themselves.
19.	An avionics upgrade that changes the method of input from the flight crew, which was not contemplated during the original certification.	No	No	Yes	A change that includes touchscreen technology typically does not invalidate the assumptions used for certification. A change that incorporates voice-activated controls or other novel human-machine interface would likely invalidate the assumptions used for certification.

A.3.3 Table A-9 contains examples of changes that are 'not significant' changes for rotorcraft (CS-27 and CS-29).

Table A-9. Examples of Not Significant Changes for Rotorcraft (CS-27 and CS-29)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
1.	Emergency floats.	No	No	No	Must comply with the specific applicable certification specifications for emergency floats. This installation, in itself, does not change the rotorcraft configuration, overall performance, or operational capability. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger-carrying operations to external-load operations, flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certified-product level.
2.	Forward looking infrared (FLIR) or surveillance camera installation.	No	No	No	Additional flight or structural evaluation may be necessary but the change does not alter the basic rotorcraft certification.
3.	Helicopter terrain awareness warning system (HTAWS) for operational credit.	No	No	No	Certified under rotorcraft HTAWS AMC guidance material and ETSO-C194. Does not alter the basic rotorcraft configuration.
4.	Health usage monitoring system (HUMS) for maintenance credit.	No	No	No	Certified under rotorcraft HUMS GM guidance material. Does not alter the basic rotorcraft configuration.
5.	Expanded limitations with minimal or no design changes, following further tests/justifications or different mix of limitations (CG limits, oil temperatures, altitude, minimum/maximum weight, minimum/ maximum external temperatures, speed, engine ratings).	No	No	No	Changes to an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger-carrying operations to external-load operations, flight over water, or operations in snow conditions) that are not so different that the original certification assumptions remain valid.
6.	Change from a single-channel FADEC to a dual-channel FADEC.				Change does not change the overall product configuration or the original certification assumptions.

Table A-9. Examples of Not Significant Changes for Rotorcraft (CS-27 and CS-29)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
7.	Installation of a new engine type, equivalent to the former one, leaving aircraft installation and limitations substantially unchanged.	No	No	No	Refer to AMC 27 or AMC 29 for guidance. Does not alter the basic rotorcraft configuration, provided there is no additional capacity embedded in the new design.
8.	Windscreen installation.	No	No	No	Does not change the rotorcraft overall product configuration.
9.	Snow skis, 'Bear Paws.'	No	No	No	Must comply with specific certification specifications associated with the change. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger-carrying operations to external-load operations, flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certified-product level.
10.	External cargo hoist.	No	No	No	Must comply with the specific applicable certification specifications for external loads. This installation, in itself, does not change the rotorcraft configuration, overall performance, or operational capability. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger-carrying operations to external-load operations (excluding HEC), flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certified-product level.
11.	IFR upgrades involving installation of upgraded components to replace existing components.	No	No	No	Not a rotorcraft-level change.
12.	An avionics change from federated electromechanical displays to federated electronic displays.	No	No	No	Changing an electromechanical display to an electronic display on a single avionics display is not considered significant.
13.	An avionics change replacing an integrated avionics system with another integrated avionics system.	No	No	No	The assumptions used to certify a highly integrated avionics system should be the same for another highly integrated avionics system.

Table A-9. Examples of Not Significant Changes for Rotorcraft (CS-27 and CS-29)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
14.	Flight deck replacement of highly integrated and combined electronic display systems with other highly integrated and combined electronic display systems.	No	No	No	Not significant if the architecture concepts, design philosophies, human–machine interface, flight-crew workload design and flight-deck assumptions are not impacted.
15.	IFR upgrades involving installation of upgraded components for new IFR configuration.	No	No	No	No changes to architecture concepts, design philosophies, human–machine interface, or flight-crew workload.
16.	Flight deck replacement or upgrade of avionics systems in non-Appendix 'B' (IFR) or non-CAT 'A' rotorcraft that can enhance safety or pilot awareness.	No	No	No	—
17.	Modifications to non-crashworthy fuel systems intended to improve its crashworthiness.	No	No	No	—
18.	Changing the hydraulic system from one similar type of fluid to another, e.g. a fluid change from a highly flammable mineral oil-based fluid (MIL-H-5606) to a less flammable synthetic hydrocarbon-based fluid (MIL-PRF-87257)	No	No	No	—
19.	An ETSO C-127 dynamic seat installed in a helicopter with an existing certification basis prior to addition of CS 29.562, Emergency landing dynamic conditions.	No	No	No	

A.4 Examples of Substantial, Significant, and Not Significant Changes for Engines (CS-E)

A.4.1 Table A-10 contains examples of changes that are 'substantial' for engines (CS-E).

Table A-10. Examples of Substantial Changes for Engines (CS-E)

Example	Description of Change	Notes
Turbine Engines		
1.	Traditional turbofan to geared-fan engine.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
2.	Low-bypass ratio engine to high-bypass ratio engine with an increased inlet area.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
3.	Turbojet to turbofan.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
4.	Turboshaft to turbo-propeller.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
5.	Conventional ducted fan to unducted fan.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.
6.	Turbine engine for subsonic operation to afterburning engine for supersonic operation.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable certification basis is required.

A.4.2 Table A-11 contains examples of changes that are 'significant' for engines (CS-E).

Table A-11. Examples of Significant Changes for Engines (CS-E)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
			Turbine Engines		
1.	Increase/decrease in the number of compressor/turbine stages with resultant change to approved operational limitations.	Yes	No	Yes	Change is associated with other changes that would affect the rating of the engine and the engine dynamic behaviour, such as backbone bending, torque spike effects on rotors and casing, surge and stall characteristics, etc.
2.	New design fan blade and fan hub, or a bladed fan disk to a blisk, or a fan diameter change, that could not be retrofitted.	Yes	No	Yes	Change is associated with other changes to the engine thrust/power, ratings, and operating limitations; engine dynamic behaviour in terms of backbone bending, torque spike effects on casing, foreign object ingestion behaviour (birds, hail, rain, ice slab); blade-out test and containment; induction system icing capabilities; and burst model protection for the aircraft. If there is a diameter change, installation will be also affected.
3.	Hydromechanical control to FADEC/electronic engine control (EEC) without hydromechanical backup.	Yes	No	No	Change to engine control configuration. Not interchangeable. Likely fundamental change to engine operation.
4.	A change to the containment case from hard-wall to composite construction or vice versa that could not be retrofitted without additional major changes to the engine or restricting the initial limitations or restrictions in the initial installation manual.	No	Yes	Yes	Change to methods of construction that have affected inherent strength, backbone bending, blade-to-case clearance retention, containment wave effect on installation, effect on burst model, torque spike effects.
5.	A change to the gas generator (core, turbine/compressor/ combustor) in conjunction with changes to approved operating limitations.	No	No	Yes	Change is associated with other changes that would affect engine thrust/power and operating limitations, and have affected the dynamic behaviour of the engine, foreign object ingestion behaviour (birds, hail storm, rain, ice shed), induction system icing capabilities. Assumptions used for certification may no longer be valid.

Table A-11. Examples of Significant Changes for Engines (CS-E)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
6.	A change from traditional metal to composite materials on an assembly or structure that provides a load path for the engine affecting the engine dynamic behaviour and/or the engine inherent strength.	No	Yes	Yes	Change to principles of construction and design.
Piston Engines					
7.	Convert from mechanical to electronic control system.	Yes	Yes	No	Change to engine configuration: installation interface of engine changed. Changes to principles of construction: digital controllers and sensors require new construction techniques and environmental testing.
8.	Add turbocharger that increases performance and changes to overall product.	Yes	No	Yes	Change to general configuration: installation interface of engine changed (exhaust system). Certification assumptions invalidated: change to operating envelope and performance.
9.	Convert from air-cooled cylinders to liquid-cooled cylinders.	Yes	No	Yes	Change to general configuration: installation interface of engine changed (cooling lines from radiator, change to cooling baffles). Certification assumptions invalidated: change to operating envelope and engine temperature certification specifications.
10.	A change from traditional metal to composite materials on an assembly or structure that provides a load path for the engine affecting the engine dynamic behaviour and/or the engine inherent strength.	No	Yes	Yes	Change to principles of construction and design.
11.	Convert from spark-ignition to compression-ignition.	Yes	No	Yes	Change to general configuration: installation interface of engine changed (no mixture lever). Certification assumptions invalidated: change to operating envelope and performance.

A.4.3 Table A-12 contains examples of changes that are 'not significant' for engines (CS-E).

Table A-12. Examples of Not Significant Changes for Engines (CS-E)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
			Turbine Engines		
1.	Change to the material from one type of metal to another type of metal of a compressor drum.	No	No	No	No change to performance. Assumptions are still valid.
2.	Increase/decrease in the number of compressor/turbine stages without resultant change to operational performance envelope.	No	No	No	No change to performance. Assumptions are still valid.
3.	Hardware design changes to the FADEC/EEC, the introduction of which does not change the function of the system.	No	No	No	No change to configuration. Retrofitable. Assumptions used for certification are still valid. Possible changes to principles of construction are insignificant.
4.	Software changes.	No	No	No	—
5.	Rub-strip design changes.	No	No	No	Component-level change.
6.	A new combustor that does not change the approved limitations or dynamic behaviour.* (*Exclude life limits.)	No	No	No	Component-level change.
7.	Bearing changes.	No	No	No	Component-level change.
8.	New blade designs with similar material that can be retrofitted.	No	No	No	Component-level change.
9.	Fan blade redesign that can be retrofitted.	No	No	No	Component-level change.
10.	Oil tank redesign.	No	No	No	Component-level change.
11.	Change from one hydromechanical control to another hydromechanical control.	No	No	No	Component-level change.
12.	Change to limits on life-limited components supported by data that became available after certification.	No	No	No	Extending or reducing the life limits. For example, extending life limits based on credits from service experience or new fatigue data.
13.	Changes to limits on exhaust gas temperature.	No	No	No	

Table A-12. Examples of Not Significant Changes for Engines (CS-E)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
14.	Changes to the Airworthiness Limitations section with no configuration changes.	No	No	No	—
15.	Bump ratings within the product's physical capabilities that may be enhanced with gas path changes, such as blade re-staggering, cooling hole patterns, blade coating changes, etc.	No	No	No	—
Piston Engines					
16.	New or redesigned cylinder head, valves, or pistons.	No	No	No	—
17.	Changes to crankshaft.	No	No	No	Component-level change.
18.	Changes to crankcase.	No	No	No	Component-level change.
19.	Changes to carburettor.	No	No	No	Component-level change.
20.	Changes to mechanical fuel injection system.	No	No	No	
21.	Changes to mechanical fuel injection pump.	No	No	No	Component-level change.
22.	Engine model change to accommodate new aircraft installation. No change to principles of operation of major subsystems; no significant expansion in power or operating envelopes or in limitations.	No	No	No	—
23.	A simple mechanical change, or a change that does not affect the basic principles of operation. For example, change from dual magneto to two single magnetos on a model.	No	No	No	—

Table A-12. Examples of Not Significant Changes for Engines (CS-E)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
24.	Subsystem change produces no changes to base engine input parameters, and previous analysis can be reliably extended. For example, a change to turbocharger where induction system inlet conditions remain unchanged, or if changed, the effects can be reliably extrapolated.	No	No	No	—
25.	Change to material of secondary structure or not highly loaded component. For example, a change from metal to composite material in a non-highly loaded component, such as an oil pan that is not used as a mount pad.	No	No	No	Component-level change.
26.	Change to material that retains the physical properties and mechanics of load transfer. For example, a change to trace elements in a metal casting for ease of pouring or to update to a newer or more readily available alloy with similar mechanical properties.	No	No	No	Component-level change.

A.5 Examples of Substantial, Significant, and Not Significant Changes for Propellers (CS-P).

A.5.1 Table A-13 contains an example of a change that is 'substantial' for propellers (CS-P).

Table A-13. Example of a Substantial Change for Propellers (CS-P)

Example	Description of Change	Notes
1.	Change to the number of blades.	Proposed change to design is so extensive that a substantially complete investigation of compliance with the applicable type-certification basis is required.

A.5.2 Table A-14 contains examples of changes that are 'significant' for propellers (CS-P).

Table A-14. Examples of Significant Changes for Propellers (CS-P)

Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
1.	Principle of pitch change, such as a change from single acting to dual acting.	Yes	Yes	Yes	Requires extensive modification of the pitch change system with the introduction of backup systems. The inherent control system requires re-evaluation.
2.	Introduction of a different principle of blade retention, such as a single row to a dual row bearing.	Yes	Yes	No	Requires extensive modification of the propeller hub and blade structure. The inherent strength requires re-evaluation.
3.	A hub configuration change, such as a split hub to a one-piece hub.	Yes	Yes	No	Requires extensive modification of the propeller hub structure. The inherent strength requires re-evaluation.
4.	Changing the method of mounting the propeller to the engine, such as a spline to a flange mount.	Yes	Yes	No	Requires extensive modification of the propeller hub structure. The inherent strength requires re-evaluation.
5.	Change to hub material from steel to aluminium.	Yes	Yes	No	Requires extensive modification of the propeller hub structure and change to method of blade retention. The inherent strength requires re-evaluation.
6.	Change to blade material from metal to composite.	Yes	Yes	Yes	Requires extensive modification of the propeller blade structure and change to method of blade retention. Composite construction methods required. The inherent strength requires re-evaluation.

Table A-14. Examples of Significant Changes for Propellers (CS-P)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
7.	Change from hydromechanical to electronic control.	Yes	Yes	Yes	Electronic manufacturing and design methods required. Assumptions used for certification are no longer valid or not addressed in the original certification, i.e. HIRF and lightning protection, fault tolerance, software certification, and other aspects.

A.5.3 Table A-15 contains examples of changes that are 'not significant' for propellers (CS-P).

Table A-15. Examples of Not Significant Changes for Propellers (CS-P)					
Example	Description of change	Is there a change to the general configuration? 21.A.101(b)(1)(i)	Is there a change to the principles of construction? 21.A.101(b)(1)(i)	Have the assumptions used for certification been invalidated? 21.A.101(b)(1)(ii)	Notes
1.	Change to the material of a blade bearing.	No	No	No	Component-level change.
2.	Change to a component in the control system.	No	No	No	Component-level change.
3.	Change to a propeller de-icer boot.	No	No	No	Component-level change.
4.	Changes to the operational design envelope, such as increase in power.	No	No	No	Propeller's operating characteristics and inherent strength require re-evaluation.
5.	Change to the intended usage, such as normal to acrobatic category.	No	No	No	Propeller's operating characteristics and inherent strength require re-evaluation.

Appendix B to GM 21.A.101 Application charts for changed product rule

ED Decision 2017/024/R

Table A-16. Application Chart for 21.A.101(a) and (b) and 21.A.19

<table>
<tr><th>Substantial
(21.A.19)</th><th colspan="4">Significant
(21.A.101(a) and (b))</th><th colspan="2">Not Significant
(21.A.101)(b)(1))</th></tr>
<tr><td rowspan="4">Substantially changed product
Compliance with all latest CSs required for product certification. Previously approved type design and compliance data may be allowed if valid for the changed product.</td><td colspan="3">Affected area
(Changed and/or affected areas)
New demonstration of compliance is required
Previously approved type design and compliance data may be allowed if valid for the changed product.</td><td rowspan="4">Unaffected area
No new demonstration of compliance is required. Unaffected area continues to comply with the existing certification basis.</td><td rowspan="4">Affected area
(Changed and/or affected areas) New demonstration of compliance is required. The applicant may propose a certification basis using an earlier amendment but not earlier than in the existing TC basis. Previously approved type design and compliance data may be allowed if valid for the changed product.</td><td rowspan="4">Unaffected area
No new demonstration of compliance is required. Unaffected area continues to comply with the existing certification basis.</td></tr>
<tr><td colspan="2">Compliance with the latest amendment materially contributes to safety</td><td rowspan="2">No material contribution to safety

The applicant may propose a certification basis using earlier CS(s), but not earlier than the existing TC basis.</td></tr>
<tr><td>Practical
—</td><td>Impractical
The applicant may propose a certification basis using earlier CS(s), but not earlier than the existing TC basis.</td></tr>
<tr><td colspan="7">Certification Basis Proposed by the Applicant</td></tr>
<tr><td colspan="2">New certification basis using latest CSs.</td><td colspan="3">CSs at earlier amendments with supporting rationale.</td><td>Existing certification basis.</td><td>Existing certification basis including ‘elects to comply’.</td><td>Existing certification basis.</td></tr>
<tr><td colspan="7">EASA Resultant Type-Certification Basis</td></tr>
<tr><td colspan="2">New certification basis using the latest CSs, and special conditions if required.</td><td colspan="3">New certification basis using the CSs at earlier approved amendments, and special conditions if required.</td><td>Existing certification basis.</td><td>Existing certification basis (if adequate); if not, first appropriate later amendment(s) and/or special conditions including ‘elects to comply’.</td><td>Existing certification basis.</td></tr>
</table>

Table A-17. Application Chart for 21.A.101(c) Excepted Products

<table>
<tr><td colspan="4">Affected area
(Changed areas and/or unchanged but affected)
New demonstration of compliance is required.
Previously approved type design and compliance data may be allowed if valid for the changed product.</td><td>Unaffected area
No new demonstration of compliance is required.
Unaffected area continues to be compliant with the existing TC basis.</td></tr>
<tr><td colspan="5">Type-Certification Basis Proposed by the Applicant</td></tr>
<tr><td colspan="4">The existing TC basis, including ‘elects to comply’.</td><td>The existing TC basis.</td></tr>
<tr><td colspan="3">Found by EASA to be ‘significant in an area’.</td><td>Not ‘significant in an area’.</td><td rowspan="3"></td></tr>
<tr><td colspan="2">Compliance with a later amendment materially contributes to safety.</td><td rowspan="2">No material contribution to safety.</td><td rowspan="2"></td></tr>
<tr><td>Practical</td><td>Impractical</td></tr>
<tr><td colspan="5">EASA Resultant Type-Certification Basis</td></tr>
<tr><td>The latest amendment designated by EASA including special conditions and including ‘elects to comply’.</td><td colspan="3">The existing TC basis. If inadequate, the first appropriate later amendment. If not appropriate, add special conditions, including ‘elects to comply’.</td><td>The existing TC basis.</td></tr>
</table>

Appendix C to GM 21.A.101 A method to determine the changed and affected areas

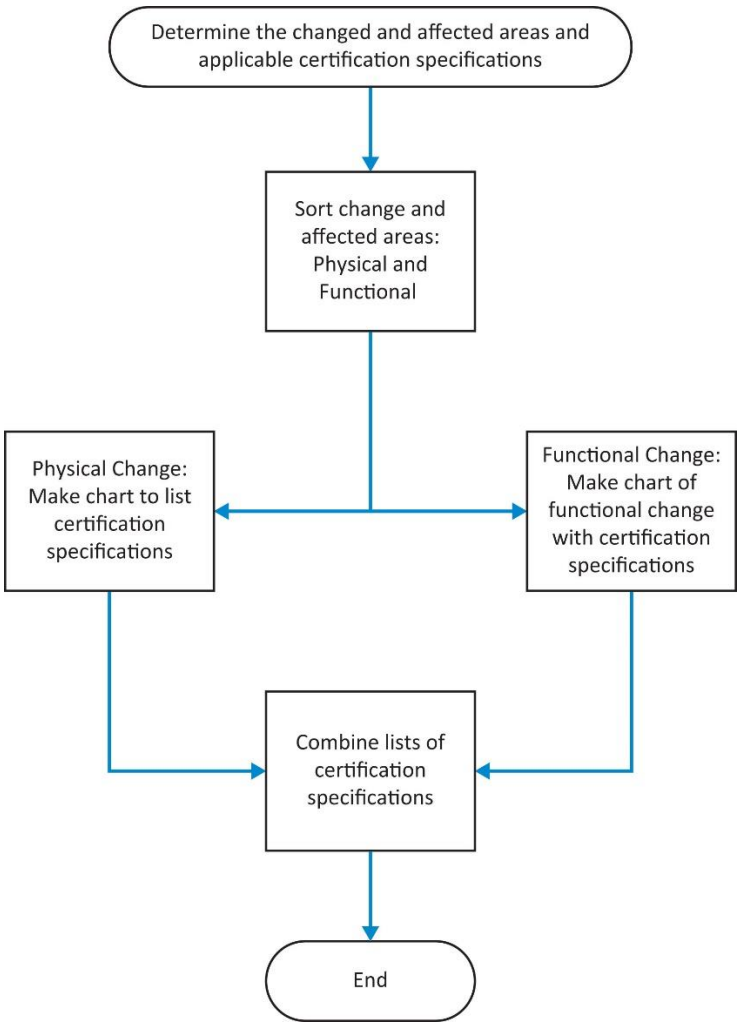
ED Decision 2017/024/R

C.1 Overview.

C.1.1 When a product is changed, some areas may change physically, while others may change functionally. EASA refers to this combination as changed and affected areas. For example, an extension to the wing of a fixed-wing aircraft would physically change the wing tip and likely other wing structure. Some areas of the airframe may have sufficient strength for the increase in load and would change functionally, i.e. they would carry greater load, but they would not change physically. These areas have associated certification specifications, which become part of the certification basis for the change.

C.1.2 Figure C-1 below provides an overview of one method that applicants may use to determine the changed and affected areas and the applicable certification specifications.

Figure C-1. Method to Determine the Changed and Affected Areas



C.2 Physical Changes.

C.2.1 Steps.

— Step 1. Make a list of the physical changes.

— Step 2. List the corresponding certification specifications applicable to the physical changes.

— Step 3. List the amendment level recorded on the existing certification basis of the baseline product and the amendments on the date of application.

C.2.2 Example.

The change is adding a winglet to a fixed-wing aircraft and a change to the leading-edge slats for a performance increase. As part of the change, an electrically driven slat actuator is modified by changing the mounting structure of the actuator used to connect the actuator to the slat. The actuator structure is changed. The electrical system in the actuator is not affected. The applicant would list certification specifications applicable to the actuator. The applicant would not list the certification specifications applicable to the electrical system of the actuator. See Table C-1 below for an example of how to chart a physical change and the associated certification specifications.

Table C-1. Example of Associating a Physical Change with the Applicable Certification Specifications

Physical Change	Applicable Certification Specifications*	Amendment of Existing Certification Basis	Amendment on Application Date
Structural change to slat actuator	25.xxx	25-aaa	25-ddd
	25.yyy	25-bbb	25-eee
	25.zzz	25-ccc	25-fff

* These would be certification specifications related to structural aspects only.

C.3 Functional Changes.

C.3.1 Steps.

— Step 1. Describe each change.

— Step 2. Describe the effects of the change (e.g. structural, performance, electrical, etc.).

— Step 3. List the areas, systems, parts, and appliances that are affected by those effects.

— Step 4. List the certification specifications associated with the effects for each area, system, part, or appliance.

— Step 5. List the amendment level recorded on the existing certification basis of the baseline product and the amendments on the date of application.

C.3.2 Example.

The change is adding a winglet to a fixed-wing aircraft and a change to the leading-edge slats for a performance increase. The wing root bending moment has increased. The loads in the wing box are increased but the wing box has sufficient structural margins to carry the higher loads. Thus, the wing box is not physically changed but its function has changed because it carries greater loads. See Table C-2 below for an example of how to chart a functional change, its effects, and the affected areas (steps 1 through 3 above). See Table C-3 below for an example of how to chart an area affected by a functional change and the associated certification specifications (steps 4 and 5 above).

Table C-2. Example of a Functional Change, Affected Areas, and Associated Effects

Description of Change	Effects	Affected Areas
Installation of winglet	Increased loads in wing structure	Wing spars
		Wing skins
	Effect 2*	Area 1
		Area 2
	Effect 3*	Area 3

* There may be other effects as well.

Table C-3. Example of Associating Affected Areas with the Applicable Certification Specifications

Impacted Area	Applicable Certification Specifications*	Amendment of Existing Certification Basis	Amendment on Application Date
Wing spar	25.xxx	25-aaa	25-ddd
	25.yyy	25-bbb	25-eee
	25.zzz	25-ccc	25-fff

* These would be structural certification specifications only. There could be other certification specifications applicable to the wing box. But since the effect is structural, then only the structural certification specifications are applicable.

C.4 Combine the Lists.

C.4.1 EASA typically presents the certification basis for a product by certification specification and not by area. The next step is to combine these two lists. However, since only a portion of the product is being changed, the changed and affected areas of the new certification basis need to be identified. The unchanged area is not required to comply with the certification specifications in effect at the date of application. (See point 21.A.101(b)(2))

C.4.2 When the change is quite extensive, applicants will save time by listing all the certification specifications applicable to the category of product they are certifying. They can use Table C-4 below in the next step where they will identify any other exceptions that they would like EASA to consider.

C.4.3 Example. If we use the examples above for the combined list for the actuator structural changes and the wing box functional change, then the certification basis would be listed as shown in Table C-4 below.

Table C-4. Example of a Combined List of Physical and Functional Changes with Applicable Certification Specifications

Certification Specification	Amendment Levels		Changed and Affected Area
	Amendment of Existing Certification Basis	Amendment on Application Date	
25.xxx*	25-aaa	25-ddd	- Wing spar - Leading-edge actuator - Wing loads
25.yyy*	25-bbb	25-eee	
25.zzz*	25-ccc	25-fff	

* These represent structural certification specifications.

Appendix D to GM 21.A.101 Other guidance for affected areas

ED Decision 2017/024/R

D.1 Sample Questions in Determining Affected Areas.

Below are sample questions to assist in determining whether an area is affected by the change. If the answer to any of these questions is yes, then the area is considered to be affected.

1. Is the area changed from the identified baseline product?
2. Is the area impacted by a significant product-level change?
3. Is there a functional effect on the unchanged area by a change to the system or system function that it is a part of?
4. Does the unchanged area need to comply with a system or product-level certification specification that is part of the change?
5. Are the product-level characteristics affected by the change?
6. Is the existing compliance for the area invalidated?

D.2 Sub-Areas within an Affected Area.

Within areas affected by a change, there may be 'sub-areas' of the area that are not affected. For those sub-areas, the amendment levels at the existing certification basis remain valid, along with the previous compliance findings. For example, if a passenger seat fitting is changed as part of a significant change, then the structure of the seat is affected. Thus, the amendment level for CS 25.561 and CS 25.562, along with other applicable structural certification specifications, would be at the amendment level on the date of application (unless an exception is granted). However, the seat fabric is not affected, so the amendment level for CS 25.853 (flammability) may remain at the existing certification basis, and a new compliance finding would not be required.

Appendix E to GM 21.A.101 Procedure for evaluating material contribution to safety or impracticality of applying latest certification specifications to a changed product

ED Decision 2019/018/R

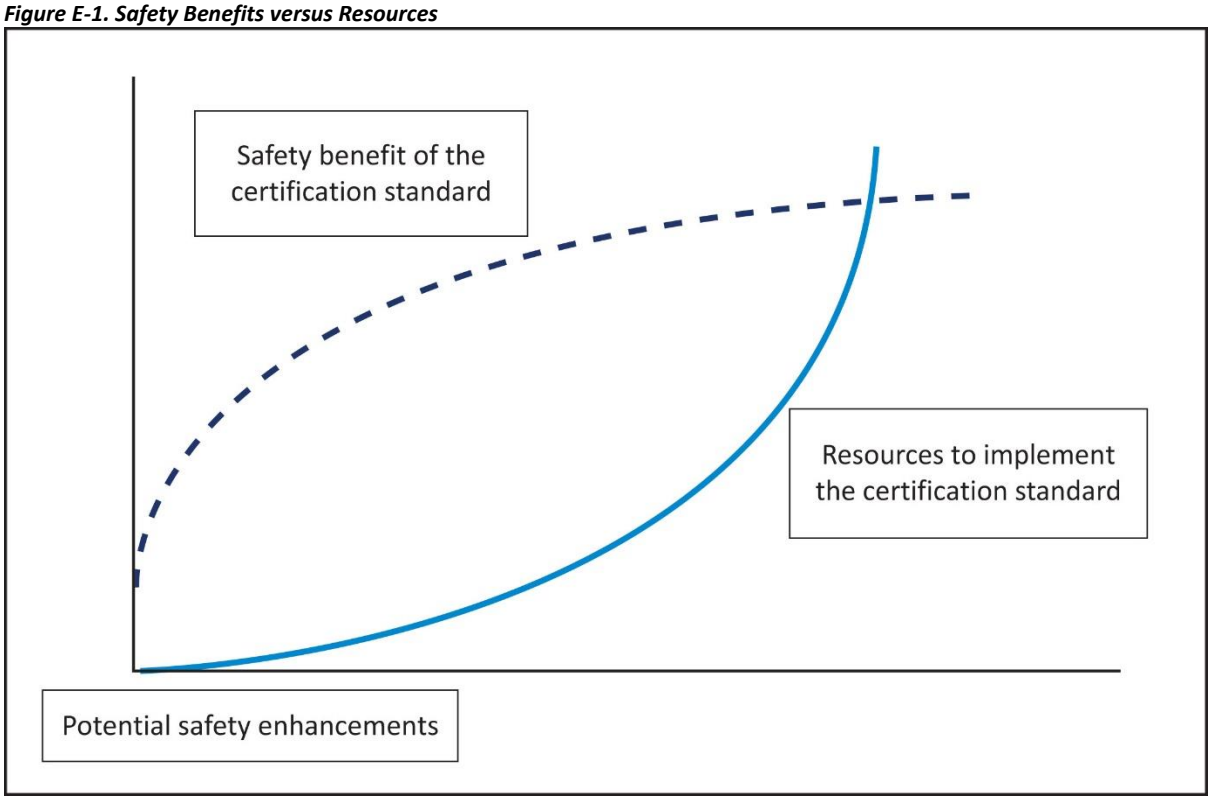
E.1 Introduction.

E.1.1 The basic principle of enhancing the level of safety of changed aeronautical products is to apply the latest certification specifications for significant changes to the greatest extent practical. In certain cases, the cost of complying fully with a later certification specification may not be commensurate with the small safety benefit achieved. These factors form the basis where compliance with the latest standard may be considered impractical, thereby allowing compliance with an earlier certification specification. This Appendix gives one method of determining whether compliance with a later certification specification is impractical; however, it does not preclude the use of other methods for improving the safety of aeronautical products.

E.1.2 EASA recognises that other procedures can be used and have historically been accepted on a case-by-case basis. The acceptance of results through the use of these procedures may vary from state to state. Consequently, they may not be accepted through all bilateral certification processes. Regardless of which method is used, the process must show that a proposed certification basis is able to achieve a positive safety benefit for the overall product.

E.1.3 Regarding impracticality, any method used must encourage the incorporation of safety enhancements that will have the most dramatic impact on the level of safety of the aircraft while considering the effective use of resources. This important point is illustrated graphically in Figure E-1 below. This Figure notionally shows the interrelation between the total resources required for incorporating each potential safety enhancement with the corresponding net increase in safety benefit.

Figure E-1. Safety Benefits versus Resources



E.1.4 Typically, it is found that, for impractical certification basis changes, there are proposals that can achieve a positive safety benefit that are resource-effective. Conversely, there are proposals that may achieve a small safety benefit at the expense of a large amount of resources to implement them. Clearly, there will be a point where a large percentage of the potential safety benefit can be achieved with a reasonable expenditure of resources. The focus of the methods used should be to determine the most appropriate certification standards relative to the respective incremental cost to reach this point.

E.1.5 This Appendix provides procedural guidance for determining the material contribution to the level of safety, or the practicality of applying a certification standard at a particular amendment level to a changed product. The procedure is generic in nature and describes the steps and necessary inputs that may be used on any project to develop a position.

E.1.6 The procedure is intended to be used, along with good engineering judgment, to evaluate the relative merits of a changed product complying with the latest certification standards. It provides a means, but not the only means, for applicants to present their position regarding an exception under point 21.A.101(b)(3).

E.1.7 The certification basis for a change to a product will not be at an amendment level earlier than the existing certification basis.

E.2 Procedure for evaluating the material contribution or impracticality of applying the latest certification specifications to a changed product.

The following are steps to determine the material contribution or impracticality of applying a certification specification at a particular amendment level.

E.2.1 Step 1: Identify the regulatory change being evaluated.

In this step, applicants should document:

E.2.1.1 The specific standard (e.g. CS 25.365),

E.2.1.2 The amendment level of the existing certification basis for the standards, and

E.2.1.3 The latest amendment level of the certification specification.

E.2.2 Step 2: Identify the specific hazard that the certification specification addresses.

E.2.2.1 Each certification specification and its subsequent amendments addresses a hazard or hazards. In this step, the specific hazard(s) is (are) identified. This identification will allow for a comparison of the effectiveness of the amendment levels of the certification specification in addressing the hazard.

E.2.2.2 In many cases, the hazard and the cause of the hazard will be obvious. When the hazard and its related cause are not immediately obvious, it may be necessary to review the explanatory note (EN) and/or the impact assessment (IA) in the ED Decision by which the certification specification or its amendment was adopted. It may also be helpful to discuss the hazard with the responsible EASA team.

E.2.3 Step 3: Review the consequences of the hazard(s).

E.2.3.1 Once the hazard is identified, it is possible to identify the types of consequences that may occur due to the hazard. More than one consequence can be attributed to the same hazard. Typical examples of consequences would include but are not limited to:

— incidents where only injuries occurred,

— accidents where a total hull loss occurred,

— accidents where less than 10 per cent of the passengers died,

— accidents where 10 per cent or more passengers died, and

— engine- and propeller-specific hazards.

E.2.3.2 The explanatory note (EN) and/or the impact assessment (IA) in the ED Decision may provide useful information regarding the consequences of the hazard that the certification specification addresses.

E.2.4 Step 4: Identify the historical and predicted frequency of each consequence.

E.2.4.1 Another source for determining impracticality is the historical record of the consequences of the hazard that led to a certification specification or an amendment to a certification specification. From these data, a frequency of occurrence for the hazard can be determined. It is important to recognise that the frequency of occurrence may be higher or lower in the future. Therefore, it also is necessary to predict the frequency of future occurrences.

E.2.4.2 More than one consequence can be attributed to the same hazard. Therefore, when applicable, the combination of consequences and frequencies of those consequences should be considered together.

E.2.4.3 The explanatory note (EN) and/or the impact assessment (IA) in the ED Decision may provide useful information regarding the frequency of an occurrence.

E.2.5 Step 5: Determine how effective full compliance with the latest amendment of the certification specification would be in addressing the hazard.

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

E.2.5.2 It is recognised that the determination of levels of effectiveness is normally of a subjective nature. Therefore, prudence should be exercised when making these determinations. In all cases, it is necessary to document the assumptions and data that support the determination.

E.2.5.3 The following five levels of effectiveness are provided as a guideline:

1. Fully effective in all cases. Compliance with the certification specification eliminates the hazard or provides a means to avoid the hazard completely.

2. Considerable potential for eliminating or avoiding the hazard. Compliance with the certification specification eliminates the hazard or provides a means to completely avoid the hazard for all probable or likely cases, but it does not cover all situations or scenarios.

3. Adequately mitigates the hazard. Compliance with the certification specification eliminates the hazard or provides a means to avoid the hazard completely in many cases. However, the hazard is not eliminated or avoided in all probable or likely cases. Usually this action only addresses a significant part of a larger or broader hazard.

4. Hazard only partly addressed. In some cases, compliance with the certification specification partly eliminates the hazard or does not completely avoid the hazard. The hazard is not eliminated or avoided in all probable or likely cases. Usually this action only addresses part of a hazard.

5. Hazard only partly addressed but action has a negative side effect. Compliance with the certification specification does not eliminate or avoid the hazard or may have negative safety side effects. The action is of questionable benefit.

E.2.5.4 If it is determined that compliance with the latest certification specifications does not contribute materially to the product's level of safety, applicants should skip Step 6 of this Appendix and go directly to Step 7 to document the conclusion. If it is determined that complying with the latest amendment of the certification specification contributes

materially to the product's level of safety, applicants should continue to Step 6 of this Appendix.

E.2.6 Step 6: Determine the incremental resource costs and cost avoidance.

E.2.6.1 There is always cost associated with complying with a certification specification. This cost may range from minimal administrative efforts to the resource expenditures that support full-scale testing or the redesign of a large portion of an aircraft. However, there are also potential cost savings from compliance with a certification specification. For example, compliance with a certification specification may avoid aircraft damage or accidents and the associated costs to the manufacturer for investigating accidents. Compliance with the latest amendment of a certification specification may also help a foreign authority to certify a product.

E.2.6.2 When determining the impracticality of applying a certification specification at the latest amendment level, only the incremental costs and safety benefits from complying with the existing certification basis should be considered.

E.2.6.3 When evaluating the incremental cost, it may be beneficial for applicants to compare the increase in cost of complying with the latest certification specifications with the cost of incorporating the same design feature in a new aircraft. In many cases, an estimate for the cost of incorporation in a new aircraft is provided by EASA in the regulatory impact assessment, which was presented when the corresponding certification specification was first issued. Incremental costs of retrofit/incorporation on existing designs may be higher than that for production. Examples of costs may include but are not limited to the following:

Costs

The accuracies of fleet size projections, utilisation, etc., may be different from those experienced for derived product designs and must be validated.

— Labour: work carried out in the design, fabrication, inspection, operation, or maintenance of a product for the purpose of incorporating or demonstrating compliance with a proposed action. Non-recurring labour certification specifications, including training, for the applicant supporting development and production of the product, should be considered.

— Capital: construction of new, modified, or temporary facilities for design, production, tooling, training, or maintenance.

— Material: costs associated with product materials, product components, inventory, kits, and spares.

— Operating costs: costs associated with fuel, oil, fees, training, and expendables.

— Revenue/utility loss: costs resulting from earning/usage capability reductions from departure delays, product downtime, and performance loss due to seats, cargo, range, or airport restrictions.

— The cost of changing compliance documentation and/or drawings in itself is not an acceptable reason for an exception.

Cost Avoidance.

— Avoiding costs of accidents, including investigation of accidents, lawsuits, public relations activities, insurance, and lost revenue.

— Foreign certification: conducting a single effort that would demonstrate compliance with the certification specifications of most certifying authorities, thus minimising certification costs.

E.2.7 Step 7: Document the conclusion.

With the information from the previous steps documented and reviewed, the applicant's position and rationale regarding whether complying with the latest certification specifications contributes materially to the product's level of safety or its practicality can be documented. EASA records the determination of whether the conditions for the proposed exception were met. That determination is based on the information and analysis provided by the applicant in the preceding steps. If the determination to grant the exception is based on the product's design features, those features are documented at a high level in the TCDS. Documentation in the TCDS is required so that the features are maintained during subsequent changes to the product, therefore, maintaining the product's agreed level of safety. If the results of this analysis are inconclusive, then further discussions with EASA are warranted.

E.3 Examples of how to certify changed aircraft.

The following examples illustrate the typical process an applicant follows. The process will be the same for all product types.

E.3.1 Example 1: FAR § 25.963, Fuel Tank Access Covers.

NOTE: This example is taken from the FAA's certification experience, so references to FAR sections and amendments are kept.

This example is part of a significant change to a transport aeroplane that increases the passenger payload and gross weight by extending the fuselage by 20 feet (6.1 metres). To accommodate the higher design weights and increased braking requirements and to reduce the runway loading, the applicant will change the landing gear from a two-wheel to four-wheel configuration; this changes the debris scatter on the wing from the landing gear. EASA will require the new model of the aeroplane to comply with the latest applicable certification specifications based on the date of application.

The wing will be strengthened locally at the side of the body and at the attachment points of the engines and the landing gear, but the applicant would not like to alter the wing access panels and the fuel tank access covers. Although the applicant recognises that the scatter pattern and impact loading on the wing from debris thrown from the landing gear will change, the applicant proposes that it would be impractical to redesign the fuel tank access covers.

Note: Points 21.B.107(a)(3) or 21.B.111(a)(3) may be an additional reason why EASA would require compliance with CS 25.963(e), regardless of the 'significant' determination.

E.3.1.1 Step 1: Identify the regulatory change being evaluated.

The existing certification basis of the aeroplane that is being changed is Part 25 prior to Amendment 25-69. Amendment 25-69 added the requirement that fuel tank access covers on transport category aeroplanes be designed to minimise penetration by likely foreign objects, and that they be fire-resistant.

E.3.1.2 Step 2: Identify the specific hazard that the certification specification addresses.

Fuel tank access covers have failed in service due to impact with high-energy objects, such as failed tire tread material and engine debris following engine failures. In one accident, debris from the runway impacted a fuel tank access cover, causing its failure and subsequent fire, which resulted in fatalities and loss of the aeroplane. Amendment

25-69 will ensure that all access covers on all fuel tanks are designed or located to minimise penetration by likely foreign objects, and that they are fire-resistant.

E.3.1.3 Step 3: Review the history of the consequences of the hazard(s).

There have been occurrences with injuries and with more than 10 per cent deaths.

E.3.1.4 Step 4: Identify the historical and predicted frequency of each consequence.

In 200 million departures of large jets, there was:

— 1 occurrence with more than 10 per cent deaths, and

— 1 occurrence with injuries.

There is no reason to believe that the future rate of accidents will be significantly different from the historical record.

E.3.1.5 Step 5: Determine how effective full compliance with the latest amendment of the certification specifications would be in addressing the hazard.

There is considerable potential for eliminating or avoiding the hazard. Compliance with Amendment 25-69 eliminates the hazard or provides a means to avoid the hazard completely for all probable or likely cases. However, it does not cover all situations or scenarios.

E.3.1.6 Step 6: Determine resource costs and cost avoidance.

Costs.

— For a newly developed aeroplane, there would be minor increases in labour resulting from design and fabrication of new fuel tank access covers.

— There would be a negligible increase in costs related to materials, operating costs, and revenue utility loss.

Cost avoidance.

— There were 2 accidents in 200 million departures. The applicant believes that it will manufacture more than 2 000 of these aeroplanes. These aeroplanes would average 5 flights a day. Therefore, statistically there will be accidents in the future if the hazard is not alleviated. Compliance will provide cost benefits related to avoiding lawsuits, accident investigations, and public relations costs.

— There are cost savings associated with meeting a single certification basis for EASA's and foreign standards.

E.3.1.7 Step 7: Document the conclusion.

It is concluded that compliance with the latest certification specification increases the level of safety at a minimal cost to the applicant. Based on the arguments and information presented by the applicant through the certification review item (CRI) process, EASA determined that meeting the latest amendment would be practical. EASA has also found that fuel tank access covers that are not impact-resistant and fire-resistant, and which are located where a strike is likely, are unsafe features or characteristics which preclude the issue of a type certificate under 21.B.107(a)(3).

E.3.2 Example 2: FAR § 25.365, Pressurized Compartment Loads.

NOTE: This example is taken from the FAA's certification experience, so references to FAR sections and amendments are kept.

This example is a passenger-to-freighter conversion STC. This change affects the floor loads on the aeroplane as well as the decompression venting.

E.3.2.1 Step 1: Identify the regulatory change being evaluated.

The existing certification basis of the aeroplane that is being changed includes § 25.365 at Amendment 25-00. The initial release of § 25.365 required the interior structure of passenger compartments to be designed to withstand the effects of a sudden release of pressure through an opening resulting from the failure or penetration of an external door, window, or windshield panel, or from structural fatigue or penetration of the fuselage, unless shown to be extremely remote.

Amendment 25-54 revised § 25.365 to require the interior structure to be designed for an opening resulting from penetration by a portion of an engine, an opening in any compartment of a size defined by § 25.365(e)(2), or the maximum opening caused by a failure that was not shown to be extremely improbable. The most significant change is the 'formula hole size' requirement introduced into § 25.365(e)(2) at Amendment 25-54.

Amendment 25-71/72 (Amendments 25-71 and 25-72 are identical) extended the regulation to all pressurised compartments, not just passenger compartments, and to the pressurisation of unpressurised areas. Pressurisation of unpressurised areas had previously been identified as an unsafe feature under § 21.B.111(a)(3).

Amendment 25-87 redefined the pressure differential load factor that applies above an altitude of 45 000 feet. Compliance with Amendment 25-87 is not affected since the aeroplane does not operate above an altitude of 45 000 feet. The applicant proposes to meet the 'pressurisation into unpressurised areas' requirement introduced in Amendment 25-71/72. The applicant does not propose to comply with the 'formula hole size' requirement introduced in § 25.365(e)(2) at Amendment 25-54.

E.3.2.2 Step 2: Identify the specific hazard that the certification specification addresses.

The hazard is a catastrophic structure and/or system failure produced by a sudden release of pressure through an opening in any compartment in flight. This opening could be caused by an uncontained engine failure, an opening of a prescribed size due to the inadvertent opening of an external door in flight, or an opening caused by a failure not shown to be extremely improbable. The opening could be caused by an event that has yet to be identified.

E.3.2.3 Step 3: Review the history of the consequences of the hazard(s).

There have been occurrences with injuries, with less than 10 per cent deaths and with more than 10 per cent deaths.

E.3.2.4 Step 4: Identify the historical and predicted frequency of each consequence.

In 200 million departures of large jets, there were:

— 2 occurrences with more than 10 per cent deaths,

— 1 occurrence with less than 10 per cent deaths, and

— 1 occurrence with injuries.

— There is no reason to believe that the future rate of accidents will be significantly different from the historical record.

E.3.2.5 Step 5: Determine how effective full compliance with the latest amendment of the certification specifications would be at addressing the hazard.

Compliance with the latest amendment eliminates the hazard or provides a means to avoid the hazard completely.

Design changes made to the proposed aeroplane bring it closer to full compliance with § 25.365 at Amendment 25-54. The original aeroplane was shown to meet the requirements for a hole size of 1.1 square feet. Amendment 25-54 would require a hole size of 5.74 square feet, and the current reinforcements for the converted aeroplane can sustain a hole size of 3.65 square feet in the forward area and 2.65 square feet at the aft area. This is 3.1 and 2.4 times, respectively, better than the original design condition of Amendment 25-0 and is a significant improvement over the worldwide passenger fleet in service.

E.3.2.6 Step 6: Determine resource costs and cost avoidance.

Costs.

There would be savings in both labour and capital costs if compliance were shown to Amendment 25-0 instead of Amendment 25-54. Major modifications to the floor beams would be necessary to meet the 'formula hole size' requirement in Amendment 25-54.

Cost avoidance.

There were 4 accidents in 200 million departures. The applicant believes that it will manufacture more than 2 000 of these aeroplanes. These aeroplanes would average 2 flights a day. Therefore, statistically there will be accidents in the future if the hazard is not alleviated. Compliance will provide cost benefits related to avoiding lawsuits, accident investigations, and public relations costs.

There are cost savings associated with meeting a single certification basis for FAA and foreign regulations.

E.3.2.7 Step 7: Document the conclusion regarding practicality.

The design complies with § 25.365 at Amendments 25-0, 25-71/72, and 25-87, and it is nearly in full compliance with Amendment 25-54. The design would adequately address the hazard at an acceptable cost. Therefore, based on arguments of impracticality discussed in an issue paper, the FAA accepts the applicant's proposal to comply with § 25.365 at Amendment 25-0.

E.3.3 Example 3: FAR § 25.981, Fuel Tank Ignition Prevention.

NOTE: This example is taken from the FAA's certification experience, so references to FAR sections and amendments are kept.

This example is part of a significant change to a transport aeroplane that increases passenger payload and gross weight by extending the fuselage by 20 feet (6.1 metres). To accommodate the longer fuselage, the applicant will modify systems wiring installations; this includes changing fuel tank system wiring. The new model of the aeroplane will be required to comply with the latest applicable certification specifications based on the date of application.

E.3.3.1 Step 1: Identify the regulatory change being evaluated.

The existing certification basis of the aeroplane that is being changed is Part 25 prior to Amendment 25-102 but includes Amendment 25-40.

Note: If the original certification basis does not include Amendment 25-40, the certification basis should be considered not adequate for fuel tank ignition prevention.

The 2001 Fuel Tank Safety (FTS) rule adopted Amendment 25-102 to add explicit requirements in § 25.981(a)(3) for demonstrating that the design precludes fuel tank ignition sources. This was required, but had in several cases not been properly applied in demonstrating compliance with §§ 25.901 and 25.1309. Amendment 25-102, § 25.981(b), added a requirement to develop fuel tank system airworthiness limitations to maintain the ignition prevention features of the design. Section H25.4, Amendment 25-102, requires the inclusion of those fuel tank system airworthiness limitations in the Airworthiness Limitations section of the Instructions for Continued Airworthiness (ICA).

Since the FAA policy for performing the failure analysis to demonstrate compliance with §§ 25.901 and 25.1309 at Amendment 25-40 and 25-46 was adopted in the explicit fuel tank ignition prevention failure analysis requirements of § 25.981(a)(3), the incremental requirement for demonstrating compliance with the ignition prevention requirements of Amendment 25-102 is to develop and implement the fuel tank system airworthiness limitations instead of developing Certification Maintenance Requirements in accordance with § 25.901(b)(2) at Amendments 25-40 through 25-46 and AC 25-19A.

E.3.3.2 Step 2: Identify the specific hazard that the certification specification addresses.

The FAA issued the 2001 FTS rule to preclude fuel tank ignition sources because of a history of fuel tank explosions. The catastrophic TWA Flight 800 in-flight fuel tank explosion on July 17, 1996, caused the death of all 230 people on board.

E.3.3.3 Step 3: Review the history of the consequences of the hazard(s).

There have been occurrences with injuries, with more than 10 per cent deaths, less than 10 per cent deaths, and no deaths.

E.3.3.4 Step 4: Identify the historical and predicted frequency of each consequence.

The 1998 Aviation Rulemaking Advisory Committee Fuel Tank Harmonisation Working Group report documented the number of historical fuel tank explosions as 16, which caused a total of 539 fatalities.

There have been 2 additional fuel tank explosions since that report was issued:

— March 3, 2001: Thai Airways International Flight 114 experienced a fuel tank explosion on the ground that caused 1 fatality and 3 serious injuries. The explosion and subsequent fire destroyed the aeroplane.

— May 4, 2006: A Malaysia Airlines Boeing 727 experienced a wing tank low pressure explosion during ground operations. There was no fire and no injuries. The wing structure suffered significant damage.

There is no reason to believe that the future rate of accidents will be significantly different from the historical record if fuel tank system airworthiness limitations are not included in the ICA as is permitted in earlier amendment levels.

E.3.3.5 Step 5: Determine how effective full compliance with the latest amendment of the certification specifications would be at addressing the hazard.

There is considerable potential for eliminating or avoiding the hazard.

In the 2008 Fuel Tank Flammability Reduction (FTFR) rule, the FAA estimated that compliance with the ignition prevention requirements of Amendment 25-102, together with the fuel tank ignition prevention airworthiness directives issued as a result of the Special Federal Aviation Regulation number 88 reviews, resulted in the range of

effectiveness in preventing fuel tank explosions between 25 to 75 per cent with a median value of 50 per cent (73 FR 42449).

E.3.3.6 Step 6: Determine resource costs and cost avoidance.

Costs.

— For newly developed designs, there would be minor increases in costs resulting from the identification and implementation of fuel tank system airworthiness limitations.

— There would be no increase in costs related to materials, operating costs, and revenue utility loss.

Cost avoidance.

There were 18 accidents in 200 million departures. The applicant believes that it will manufacture more than 2 000 of these aeroplanes or derivatives of these aeroplanes. These aeroplanes would average 5 flights a day. Therefore, statistically there will be accidents in the future if the hazard is not alleviated. Compliance will provide cost benefits related to avoiding fatalities and injuries.

E.3.3.7 Step 7: Document the conclusion.

It is concluded that compliance with the latest certification specification increases the level of safety at a minimal cost to the applicant. Based on the arguments and information presented by the applicant through the issue paper process, the FAA determined that meeting the latest amendment would be practical.

The following is additional background on the specific hazard that the certification specification addresses:

As stated in the 2001 FTS rule under 'Changes to Part 25', § 25.981(a)(3) was adopted because the previous regulations (§§ 25.901 and 25.1309) were not always properly applied.

Section 25.901(b)(2), Amendments 25-40 through 46, requires in part preventative maintenance as necessary to ensure that components of the powerplant installation, which includes the fuel tank system, will safely perform their intended function between inspections and overhauls defined in the maintenance instructions. When demonstrating compliance with the requirements of § 25.901(b) for maintenance of fuel tank ignition prevention features, the policy has been that the applicant identify critical features as critical maintenance requirements using the guidance in AC 25-19A.

Appendix F to GM 21.A.101 The use of service experience in the exception process

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F.1 **Introduction.**

Service experience may support the application of an earlier certification specification pursuant to point 21.A.101(b)(3) if, in conjunction with the applicable service experience and other compliance measures, the earlier certification specification provides a level of safety comparable to that provided by the latest certification specification. The applicant must provide sufficient substantiation to allow EASA to make this determination. A statistical approach may be used, subject to the availability and relevance of data, but sound engineering judgment must

be used. For service history to be acceptable, the data must be both sufficient and pertinent. The essentials of the process involve:

— A clear understanding of the certification specification change and the purpose for the change,

— A determination based on detailed knowledge of the proposed design feature,

— The availability of pertinent and sufficient service experience data, and

— A comprehensive review of that service experience data.

F.2 **Guidelines.**

The CRI process (either as a stand-alone CRI or included in the CRI A-01) would be used, and the applicant should provide documentation to support the following:

F.2.1 The identification of the differences between the certification specification in the existing basis and the certification specification as amended, and the effect of the change to the specification.

F.2.2 A description as to what aspect(s) of the latest certification specifications the proposed changed product would not meet.

F.2.3 Evidence showing that the proposed certification basis for the changed product, together with applicable service experience, relative to the hazard, provides a level of safety that approaches the latest certification specification, yet is not fully compliant with the latest certification specifications.

F.2.4 A description of the design feature and its intended function.

F.2.5 Data for the product pertinent to the requirement.

F.2.5.1 Service experience from such data sources, such as:

— Accident reports,

— Incident reports,

— Service bulletins,

— Airworthiness directives,

— Repairs,

— Modifications,

— Flight hours/cycles for fleet leader and total fleet,

— World airline accident summary data,

— Service difficulty reports,

— Accident Investigation Board reports, and

— Warranty, repair, and parts usage data.

F.2.5.2 Show that the data presented represent all relevant service experience for the product, including the results of any operator surveys, and is comprehensive enough to be representative.

F.2.5.3 Show that the service experience is relevant to the hazard.

F.2.5.4 Identification and evaluation of each of the main areas of concern with regard to:

— Recurring and/or common failure modes,

— Cause,

— Probability by qualitative reasoning, and

— Measures already taken and their effects.

F.2.5.5 Relevant data pertaining to aircraft of similar design and construction may be included.

F.2.5.6 Evaluation of failure modes and consequences through analytical processes. The analytical processes should be supported by:

— A review of previous test results,

— Additional detailed testing as required, or

— A review of aircraft functional hazard assessments (FHA) and any applicable system safety assessments (SSA) as required.

F.2.6 A conclusion that draws together the data and the rationale.

F.2.7 These guidelines are not intended to be limiting, either in setting the required minimum elements or in precluding alternative forms of submission. Each case may be different, based on the particulars of the system being examined and the requirement to be addressed.

F.3 **Example: 25.1141(f) for Transport Category Aeroplanes.**

NOTE: This example is taken from the FAA's certification experience, so references to FAR sections and amendments are kept.

F.3.1 The following example, for transport category aeroplanes (§ 25.1141(f), APU Fuel Valve Position Indication System), illustrates the typical process an applicant follows. The process will be the same for all product types.

F.3.2 This example comes from a derived model transport aeroplane where significant changes were made to the main airframe components, engines and systems, and APU. The baseline aeroplane has an extensive service history. The example shows how the use of service experience supports a finding that compliance with the latest certification specifications would not contribute materially to the level of safety and that application of the existing certification basis (or earlier amendment) would be appropriate. The example is for significant derived models of transport aeroplanes with extensive service history. It illustrates the process, following the guidelines in this Appendix, but does not include the level of detail normally required.

F.3.2.1 Determine the differences between the certification specifications applied in the original certification basis and the latest certification specification, and the effect of the change to the certification specifications. The original certification basis of the aeroplane that is being changed is the initial release of Part 25. Amendment 25-40 added requirement § 25.1141(f), which mandates that power-assisted valves must have a means to indicate to the flight crew when the valve is in the fully open or closed position, or is moving between these positions. The addressed hazard would be risk of APU fire due to fuel accumulation caused by excessive unsuccessful APU start attempts.

F.3.2.2 What aspect of the proposed changed product would not meet the latest certification specifications? The proposed APU fuel valve position indication system does not provide the flight crew with fuel valve position or transition indication and, therefore, does not comply with the requirements of § 25.1141(f).

F.3.2.3 The applicant provides evidence that the proposed certification basis for the changed product, together with applicable service experience of the existing design, provide a level of safety that approaches, yet is not fully compliant with, the latest certification specifications. The APU fuel shut-off valve and actuator are unchanged from those used on the current family of aeroplanes, and have been found to comply with the earlier Amendment 25-11 of § 25.1141. The existing fleet has achieved approximately (#) flights during which service experience of the existing design has been found to be acceptable. If one assumes a complete APU cycle, i.e. start-up and shutdown for each flight, the number of APU fuel shut-off valve operations would be over 108 cycles, which demonstrates that the valve successfully meets its intended function and complies with the intent of the certification specification.

F.3.2.4 The applicant provides a description of the design feature and its intended function. The fuel shut-off valve, actuator design, and operation is essentially unchanged with the system design ensuring that the valve is monitored for proper cycling from closed to open at start. If the valve is not in the appropriate position (i.e. closed), then the APU start is terminated, an indication is displayed on the flight deck, and any further APU starts are prevented. Design improvements using the capability of the APU electronic control unit (ECU) have been incorporated in this proposed product change. These design changes ensure that the fuel valve indication system will indicate failure of proper valve operation to the flight crew, and these features increase the level of functionality and safety, but the system does not indicate valve position as required by § 25.1141(f).

F.3.2.5 The FAA and the applicant record this in an issue paper. The FAA can use the G-1 or a technical issue paper for this purpose. An issue paper was coordinated, included data, or referenced reports documenting relevant service experience compiled from incident reports, fleet flight hour/cycle data, and maintenance records. The issue paper also discussed existing and proposed design details, failure modes, and analyses showing to what extent the proposed aeroplane complies with the latest amendment of § 25.1141. Information is presented to support the applicant's argument that compliance with the latest amendment would not materially increase the level of safety. Comparative data pertaining to aircraft of similar design and construction are also presented.

F.3.2.6 The conclusion, drawing together the data and rationale, is documented in the G-1 issue paper. The additional features incorporated in the APU fuel shut-off valve will provide a significant increase in safety to an existing design with satisfactory service experience. The applicant proposes that compliance with the latest amendment would not materially increase the level of safety and that compliance with § 25.1141 at Amendment 25-11 would provide an acceptable level of safety for the proposed product change.

Appendix G to GM 21.A.101 Changed product rule (CPR) decision record

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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 GM 21.A.101)	The proposed type design changes are identified here or in the following document(s): Click here to enter text.	
Note: The CRI 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 GM 21.A.101)	☐ Yes	**New Type Certificate:** Proceed to point 21.A.19. Point 21.A.101 does not apply. A Certification Review Item CRI A-01 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 GM 21.A.101)	☐ Yes	**Latest Standards:** Propose a certification basis using the CSs 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 GM 21.A.101)	**Note:** For multiple groupings, continuation of this process should be split into separate decision records. Groupings may be rationalised 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 GM 21.A.101)	☐ Yes	**Proceed to Step 6.**
	☐ No	Earlier Standards: Propose a certification basis using the CSs 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 GM 21.A.101) **Affected Areas:**	The Affected Area(s) is (are) detailed here or in the following Certification Basis List document number(s): Click here to enter text. Process and propose each applicable certification specification individually. **Proceed to Step 7.**	
Not Affected Areas:	Existing Standards: You may continue using the existing certification basis.	
Step 7: Do the latest standards contribute materially to the level of safety and are they practical? (See paragraph 3.10 of GM 21.A.101)	☐ Yes	Latest Standards: Propose a certification basis using the CSs in effect on the date of application.
	☐ No	Earlier Standards: You may propose a certification basis using the CSs 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 CSs may apply to each affected area, and the assessment may differ from specifications to specifications. Indicate '**Yes**' if compliance with any latest standard(s) is required. Indicate '**No**' only if earlier standard(s) is (are) proposed.	
Note:	You may submit a proposal for the decision in Step 7; however, EASA will make the final certification basis determination.	
Step 8: Ensure the proposed certification basis is adequate. (See paragraph 3.11 of GM 21.A.101)	If you deem that the certification basis is adequate, submit the proposed certification basis to EASA. If not, consult EASA. CRI A-01 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 point 21.A.101.	☐ Not significant, pursuant to point 21.A.101.	
Click here to enter text.		Click here to enter text.
Printed Name/Title	Signature	Date

Appendix H to GM 21.A.101 Examples of documenting the proposed certification basis list

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H.1 **Example 1.**

H.1.1 This optional tool may be used to establish the applicable airworthiness and OSD certification specifications that will become part of the type-certification basis for airworthiness or OSD certification basis. For a significant change, the applicant must demonstrate compliance for the change and the area affected by the change with the certification specifications that were in effect at the date of application. However, in some cases earlier or later certification specifications can be used, as allowed in point 21.A.101.

H.1.2 In order to efficiently determine and agree upon a certification basis with EASA, the following information is useful to understand the applicant's position:

H.1.2.1 The scope of the change. This includes a high-level description of the physical and functional changes and performance/functional characteristics, which are changed as a result of the physical or functional change, and the certification specifications for which compliance demonstration is required as a result of the change.

H.1.2.2 The amendment level of all the applicable certification specifications at the date of application.

H.1.2.3 The proposed certification basis, including amendment levels.

H.1.2.4 Applicants who propose a certification basis that includes amendment levels earlier than what was in effect at the date of application should include the exception as outlined in point 21.A.101 and their justification if needed.

H.1.3 Exceptions.

H.1.3.1 Unrelated changes that are not significant (point 21.A.101(b)(1)).

H.1.3.2 Not affected by the change (point 21.A.101(b)(2)).

H.1.3.3 Compliance with the certification specification would not contribute materially to the level of safety (point 21.A.101(b)(3)).

H.1.3.4 Compliance with the certification specification would be impractical (point 21.A.101(b)(3)).

H.1.4 One easy way to document the proposed certification basis is using a tabular form as shown in Table below.

Table H-1. Tabular Form for Documenting a Proposed Certification Basis

CS	Amendment Levels			Applicant Justification for Lower Amendment Level and Comments	Affected Area
	Existing TCDS Amendment	Amendment at Date of Application	Proposed Amendment Level		
Subpart A — General					
Subpart B — Flight					

H.1.5 Best Practices.

H.1.5.1 Account for all certification specifications, even if they are not applicable.

H.1.5.2 Mark certification specifications that are not applicable as 'N/A'.

H.1.5.3 If more than one amendment level is used depending on the area of the product, list all areas and amendment levels at each area with proper justification.

H.1.5.4 If the justification is long, provide the justification below the table and only place the certification specification reference and note in the comment field.

H.1.5.5 Include airworthiness and OSD standards required by other EU regulations (e.g. Part-26) of affected areas.

H.2 **Example 2.**

Pages 129 through 135 of this Appendix contain another example for documenting a proposed certification basis.