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INSPECTION AND UPDATE OF THE FINNISH BORDER GUARD'S ENGINEERING ORDER MODIFICATION DOCUMENT

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ABSTRACT

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As a governmental authority, the Finnish Border Guard may design and approve changes to the operational equipment of its aircraft. When changes are required to other aircraft areas in the type-certificate, the changes must be approved by the European Aviation Safety Agency, EASA. The European Commission regulations detail the requirements for the approval.

This bachelor's thesis explains the European Commission requirements for minor changes and provides further guidance on the approval process based on industry standards and EASA guidance documents. The Engineering Order – Modification document, EOM, which is used as a certification programme and a work order in Finnish Border Guard's modification projects, is updated to correspond with the requirements and recommendations set for minor changes. Additionally, this thesis details the obligations of a minor change approval holder and advises including them in the EOM.

The research indicates that fundamental updates to the EOM document are the inclusion of rationale for minor change classification and the creation of a separate compliance document that includes the substantiation data for the regulation compliance. Additionally, the examination suggests including responsibilities for production coordination, record-keeping and continuing airworthiness in the EOM.

The thesis further recommends using industry standards to demonstrate compliance with regulations and provides guidance if standards are not available. While the thesis considers the regulations and recommendations from the governmental authority perspective, the thesis would support any European organisation in a minor change approval process.

Keywords: Minor change, certification programme, demonstration of compliance

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS	
1.INTRODUCTION	1
2.LEGISLATION AND GUIDANCE MATERIAL FOR MINOR CHANGES	3
2.1 Aircraft's certification basis	3
2.2 Exceptions for governmental aircraft	5
2.3 Guidance material for aircraft certification	6
3.REQUIREMENTS FOR CERTIFICATION PROGRAMME AND MINOR CHANGE APPROVAL.....	7
3.1 The authority in Minor Change approval.....	7
3.2 The outline of the Engineering Order – Modification document	7
3.3 The outline of the requirements for a certification programme	8
3.4 Contents of the change description	9
3.5 Determination of the certification basis.....	11
3.6 Embodiment and installation instructions	11
3.7 Demonstration of compliance.....	13
4.COMPLIANCE DOCUMENT	15
4.1 Contents of the compliance table	15
4.2 Substantiation of the compliance.....	17
4.3 Guidance documents for compliance demonstration	18
5.OBLIGATIONS OF A MINOR CHANGE APPROVAL HOLDER	19
5.1 Coordination between design and production.....	19
5.2 Obligations for record-keeping	20
5.3 Instructions for continued airworthiness	20
5.4 Availability of operational suitability data	21
5.5 Part markings.....	21
6.SUMMARY	22
REFERENCES.....	24
ANNEX A: MINOR CHANGE CERTIFICATION GUIDANCE DOCUMENT	27
ANNEX B: ARRANGEMENT SAMPLE FORM	37

LIST OF ABBREVIATIONS

AC	Advisory Circular
AMC	Acceptable Means of Compliance
ASD	AeroSpace and Defence Industries Association of Europe
ASTM	American Society for Testing and Materials
CAMO	Continued Airworthiness Maintenance Organisation
CM	Certification Memoranda
CS	Certification Specification
EASA	European Aviation Safety Agency
EOM	Engineering Order – Modification
EPA	European Part Approval
EUROCAE	European Organisation for Civil Aviation Equipment
FAA	Federal Aviation Authority
FBG	Finnish Border Guard
GM	Guidance Material
IPC	Illustrated Parts Catalog
MCCGD	Minor Change Certification Guidance Document
MMEL	Master Minimum Equipment List
OSD	Operational Suitability Data
SAE	Society of Automotive Engineers
TC	Type-Certificate

1. INTRODUCTION

As a governmental authority, The Finnish Border Guard (FBG) can design and approve modifications to the operational equipment of its aircraft. If a change is conducted to other parts in the aircraft's type-certificate, the change must be approved in Europe by the European Aviation Safety Agency (EASA), the European Authority for aviation safety. To be approved, a certification programme of the modification must comply with the requirements set by the European Commission. This thesis inspects and updates the Finnish Border Guard's Engineering Order – Modification -document (EOM) to complete the European Commission regulations and EASA recommendations set for a certification programme of a minor change. In addition to minor change approvals, the update reassures the quality of internal modifications and the approval process for the changes in operational equipment.

Minor changes are modifications to the original aircraft type-certificate that, according to Europe Commission Regulation (No 748/2012, 21.A.91), have no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics, operational suitability data, or other characteristics affecting the airworthiness of the product or its environmental characteristics. All other modifications are considered major changes. The classification of the change to minor and major is complex and excluded from this thesis. Thus, this thesis assumes that the preparation of the certification programme is conducted when determined that the change is minor.

For adequate completeness of the minor change application, three research problems must be answered. *Firstly*, it must be determined how the contents of the EOM must be updated to comply with the requirements of the certification programme. *Secondly*, any ambiguous contents of the EOM should be clarified. *Thirdly*, the required depth of the compliance demonstration must be determined, and the methods to demonstrate compliance.

To answer the three research problems of this thesis, the requirements of the minor change certification programme are explained and reflected against the EOM. Then, appendments to the EOM are suggested based on the regulations and guidance material. The ambiguous contents of the EOM are clarified by explanatory remarks, and guidance references are proposed to be inserted into an EOM guidance document. To clarify the modification process, the required depth of compliance demonstration is evaluated, and

means of compliance are proposed based on guidance documents and industry standards. As the Finnish Border Guard have internal purposes for the contents of the EOM, this thesis should provide information to supplement the EOM rather than suggest the removal of contents. However, suggestions to simplify the document structure are given.

The following chapter describes the legislation structure and supervisory authorities involved in minor changes, and it further explains valuable guidance documents and differentiates the binding regulations and non-binding recommendations. Then, after a brief introduction of the current EOM version, the rules and their induced corrections for the certification programme are described. Emphasis is on the compliance demonstration and on the contents of a compliance document produced for the demonstration. The last chapter explains the obligations of a holder of the minor change approval and advises including them in the EOM.

2. LEGISLATION AND GUIDANCE MATERIAL FOR MINOR CHANGES

This chapter describes legislation and guidance documents for minor changes from binding regulations to less-binding regulations, recommendations and guidance documents. The sources described in this chapter specify the rules for the EOM in the following chapters.

The basis of European aviation regulation is the Basic Regulation (No 2018/1139) of the European Parliament and Council. The European Commission supplements the Basic Regulation by binding Implementing Rules. For the design changes, the associated Implementing Rule is European Commission Regulation No 748/2012 and especially its Annex I, more commonly known as Part 21. It regulates the certification of aircraft and aircraft-related products, as well as the aircraft design and production organisations. This thesis refers to the 2021 update of Part 21.

The following section explains the certification basis of an aircraft, often referred to in Part 21. Then, the effect of the Finnish Aviation Act on the minor changes is considered. The last section of this chapter describes important guidance documents for aircraft certification. The guidance documents include the Acceptable Means of Compliance and Guidance Material (AMC & GM) by EASA and Advisory Circulars (AC) issued by the Federal Aviation Authority (FAA), the aviation authority in the United States. Additionally, the last section describes a Minor Change Certification Guidance Document (MCCGD), which may be used as a certification programme template for minor changes in general aviation aircraft.

2.1 Aircraft's certification basis

The certification basis consists of the aircraft's *type-certification basis*, *operational suitability data certification basis* and *environmental protection requirements*. They are established and notified to the applicant for an aircraft type-certificate (TC) or restricted type certificate by European Aviation Safety Agency. The bases consist of detailed certification specifications that indicate to applicants the conditions under which certificates are issued, amended or supplemented. (Commission Regulation (EU) No 748/2012, 21.B.70; 21.B.80; 21.B.82; 21.B.85)

The certification specifications do not always guarantee a sufficient level of safety. European Commission Regulation (No 748/2021, 21.B.75) states that EASA may apply

special conditions if the aircraft has unusual features or the use of the aircraft is unusual. Additionally, special conditions may be applied if the experience has shown that similar designs have a risk of developing hazardous conditions. The purpose of the special conditions is to guarantee equivalent safety to the certification specifications.

The *type-certification basis* determines certification specifications for the technical airworthiness of the aircraft. Typical specifications are the European Aviation Safety Agency's *Certification Specifications* and the *Airworthiness Standards* issued by the FAA. The sections in both specifications are maintained similar, and their contents are updated regularly to correspond with each other. The airworthiness rules are often called the design code. (Gratton 2015, pp. 3–5)

EASA's *Certification Specifications* are divided into parts. The parts listed below contain airworthiness rules for aircraft type-certification and are used as the type-certification basis for most European commercial aircraft:

CS-23 Normal Category Aeroplanes

CS-25 Large Aeroplanes

CS-27 Small Rotorcraft

CS-29 Large Rotorcraft.

The Certification Specification parts 23 and 25 include aeroplane specifications. The maximum passenger number and the maximum take-off mass predominantly define their applicability to aircraft. The Normal Category Airplanes are fixed-wing aircraft with 19 or less passenger seats and a maximum certified take-off mass of 8618 kg or less (EASA, 2020, pp. 12). Part 25 is for turbine-powered large aeroplanes (EASA 2021a, pp. 51), where large aeroplanes can be considered aircraft greater in size than those described in part 23.

The Certification Specification parts 27 and 29 apply to rotorcraft in an equivalent manner. Part 27 applies to small rotorcraft with a maximum weight of 3175 kg and nine passenger seats or less (EASA 2021b, 1-A-1). Rotorcraft greater in size are Large Rotorcraft, and CS-29 regulates their airworthiness.

Correspondingly, the Parts of the FAA *Airworthiness Standards* include the airworthiness rules for commercial aircraft under FAA legislation:

Part 23 Normal category Airplanes

Part 25 Transport Category Airplanes

Part 27 Normal Category Rotorcraft

Part 29 Transport Category Rotorcraft.

The classification between Normal and Transport Categories corresponds with respective parts in the Certification Specifications. Additionally, Airworthiness Standards and Certification Specifications contain parts created to regulate airworthiness other than commercial aircraft. (Gratton 2016, pp. 4-11)

In addition to the type-certification basis, aircraft must comply with their *operational suitability data certification basis* and *the environmental protection requirements*. European Commission Regulation (No 748/2012 Article 1 2 k) defines the operational suitability data (OSD). It consists of the minimum pilot syllabus, the definition of the scope of the aircraft validation source data, the minimum syllabus of maintenance certifying staff, the type-specific data for cabin crew, and the Master Minimum Equipment List (MMEL). The aircraft validation source data is for objective qualification of simulators and to support the interim qualification of the simulators.

The *environmental protection requirements* specified in Annex 16 of the Chicago Convention contain requirements for noise and emissions (Commission Regulation (EU) No 748/2012, 21.A.85). As the appreciable effect on operational suitability data and environmental protection requirements leads to major change classification, the OSD and environmental protection requirements are often not part of the compliance demonstration of a minor change. However, the effect on those requirements must be considered when classifying the change.

2.2 Exceptions for governmental aircraft

The Finnish Aviation Act (Ilmailulaki 864/2014, 42 §) requires that The Finnish Transport and Communications Agency (Traficom) must approve the design, manufacture or maintenance of an aircraft or its equipment. The requirement does not apply to minor changes or minor repair designs.

The legislation provides exceptions to the operational equipment of governmental aircraft. The Aviation Act (Ilmailulaki 864/2014, 8 §) states that governmental aircraft can be equipped with special equipment of which the authority operating the aircraft is responsible for acceptance, utilisation and supervision. Additionally, it states that Traficom may grant individual, minor and technical exceptions to special equipment of governmental aircraft. The Aviation Act then allows Finnish Border Guard to design and approve *any changes* to its aircraft's operational equipment. Additionally, the FBG may design *minor changes* to the *aircraft type design* for EASA approval when adhering to the rules of the Aviation Act.

If the equipment change is major, it should be specified in the EOM since the Finnish Border Guard uses the EOM as a certification programme for all aircraft changes. Major classification might propose stricter restrictions and obligations for the modification process than described in this thesis.

2.3 Guidance material for aircraft certification

EASA and FAA provide guidance material for their certification specifications. EASA offers Acceptable Means of Compliance and Guidance Material (AMC & GM) documents for the guidance of its Certification Specifications. The AMC provides non-binding implementing standards that fulfil the requirements of the Basic Regulation and its Implementing Rules. The Guidance Material is solely for guidance and has no legislative force. (EASA, no date) The FAA Advisory Circulars share the same purpose as the EASA Acceptable Means of Compliance. The Circulars explain approved means, but not the only means, to comply with the Airworthiness Standards of the FAA.

For Part 21, EASA has published the AMC & GM to Part 21 (EASA 2012). The latest amendment was published in 2021. Furthermore, EASA provides corresponding AMC & GM documents for each of the Certification Specifications mentioned in section 2.1.

Minor Change Certification Guidance Document (ANNEX 1) is a guidance document to guide the modification process of a minor change for a general aviation aircraft. EASA created it to assist minor change applicants in completing the requirements of Part 21 for a certification programme, and to have a uniform methodology for pursuing minor changes (ANNEX 1, p. 1). Chapter 4 discusses the requirements for the certification programme in more detail.

As the Minor Change Certification Guidance Document can be used as a basis for a certification programme, it shares the same purpose as the Finnish Border Guard Engineering Order - Modification. However, EASA addressed the MCCGD to minor changes in general aviation aircraft, and the FBG's aircraft do not belong to that category.

3. REQUIREMENTS FOR CERTIFICATION PROGRAMME AND MINOR CHANGE APPROVAL

Chapter 3 describes the requirements for approval of a minor change and suggests updates to the EOM and its guidance documents. The first section of this chapter explains the authority approving the minor changes. Then, section 3.2 describes the purpose and outline of the current certification programme, EOM. From 3.3 to 3.7, sections consider requirements and other inclusions for the certification programme.

3.1 The authority in Minor Change approval

According to European Commission Regulation (No 748/2012, 21.A.95, 21.A.97), classification and approval of changes to minor and major are conducted by an approved design organisation or EASA. Any natural or legal person may apply for approval of a minor change (Commission Regulation (EU) No 748/2012, 21.A.92). As the Finnish Border Guard is not an approved design organisation, EASA classifies and approves the change. EASA further determines its involvement at every level of the certification project and informs the applicant about the level accordingly (Commission Regulation (EU) No 748/2012, 21.B.100).

A section on the level of involvement of the EASA should be included in the EOM. Additionally, the EOM guidance document should contain a remark on the section content about presenting the level of involvement in the EOM if used as a certification programme for a minor change. Additionally, the contact information of EASA should be included.

3.2 The outline of the Engineering Order – Modification document

Finnish Border Guard created the Engineering Order - Modification document to guide and approve the completion of modifications of the special equipment of its aircraft. The equipment modifications are approved internally by the FBG. Furthermore, the FBG has since used the document as a work order for an EASA approved minor change.

The EOM consists of three chapters:

1. Planning information
2. Material information
3. Accomplishment instructions.

The chapter *Planning information* includes the most relevant information for change certification. It explains the description and reason for the modification and specifies the type-certification basis for each affected aircraft. In addition, it introduces a compliance table to display compliances with the affected requirements of the certification basis. The chapter considers further the effects on publications, electrical load/power consumption, software upgrades/updates and weight and balance.

Materials and equipment needed to complete the modification are detailed in the *Materials information* chapter. Additionally, logistic information regarding the parts and tools is described in the chapter. The last chapter in the EOM, *Accomplishment instructions*, guides the execution of the modification. Additionally, it presents instructions for operations, maintenance and airworthiness monitoring. Section 3.6 of this thesis further details the contents of the Materials information and Accomplishment instructions.

3.3 The outline of the requirements for a certification programme

The EOM should be updated to ensure that the certification programme requirements described in European Commission Regulation (No 748/2012, 21.A.93) are completed. Figure 1 presents the European Commission requirements for a minor change certification programme.

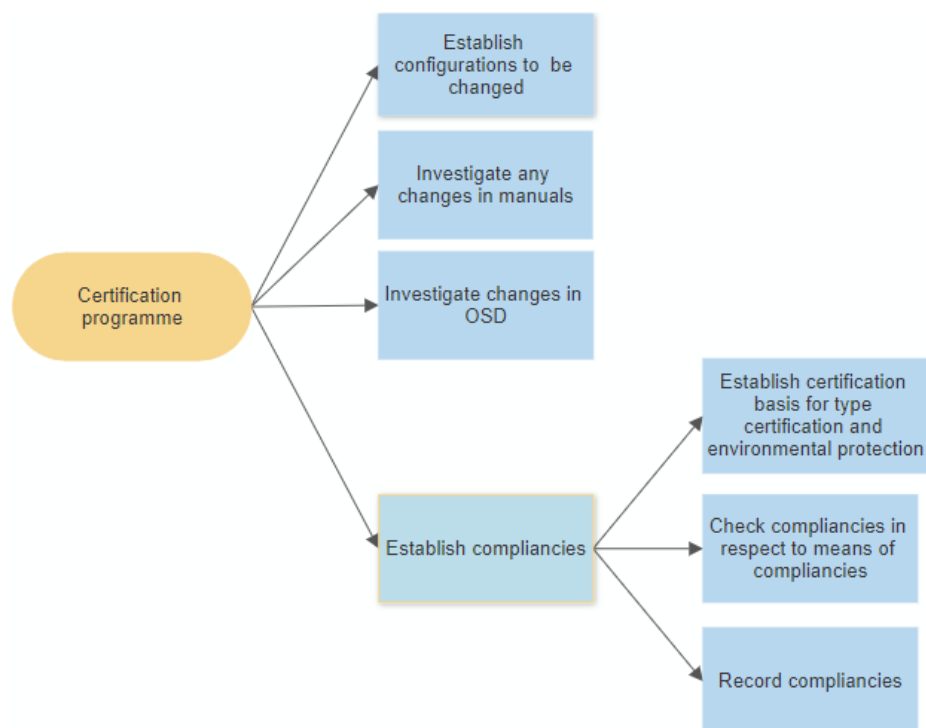


Figure 1. European commission requirements for Minor change certification programme.

The requirements of the certification programme include a description of the change. The description should include the aircraft configurations, changes in all the product areas, including manuals in the type-certificate, and all necessary changes in the operational suitability data. Additionally, it should demonstrate compliance with the Type-certification, operational suitability data certification, and environmental protection requirements in the affected areas of the change. EASA (2019, pp.34) supplements the European Commission regulations by implying that the embodiment and installation instructions are needed for minor change approval.

The following section provides update suggestions and further clarification and recommendations from other sources for the description of the change. Section 3.5 considers the requirements on the certification basis, followed by reflections on the embodiment and installation instructions in section 3.6.

3.4 Contents of the change description

The Engineering Order – Modification currently includes a Description subsection with no instructions on the contents. To clarify the subsection and to obey the requirements for the change description specified in section 3.3 of this thesis, the requirements for the description are further detailed.

The European Commission Regulation (No 748/2012, 21.A.95) states that the approval of a minor change applies to specified configurations in the type-certificate. EASA (2019, pp. 35) clarifies the term specified configurations as the combination of the type/model and the list of already approved changes required for the change. Additionally, EASA (2019, pp. 31) states that the description should include the pre- and post-modification configurations. The Minor Change Certification Guidance Document (ANNEX 1, p. 4) suggests appending the description with all approved changes' limitations and conditions with the configurations. It further emphasises that the minor change cannot extend the type of operations approved for an aircraft.

In addition to effective configurations, the effective parts should be listed. The MCCGD (ANNEX 1, pp. 3) advise including the locations of removed and installed equipment and components in the description. The Effectivity subsection of the EOM currently holds the location for the specifications of affected configurations and parts. For clarification, the subsection should be divided into two subsections: Affected configurations and Affected parts. Tables for the information of the configurations and part tables should append the EOM.

The Affected configurations subsection should include a configuration table as in ANNEX 1 section 3 (pp. 4). The configuration table includes fields for the type, model, serial number of the aircraft, and the Type-Certificate Data Sheet (TCDS) revision. In addition, the earlier changes and the induced limitations and conditions should be considered in their individual subsections. A remark on the extension restriction of the approved operations should be appended to the EOM guidance document.

The Affected parts subsection in the EOM should include a table similar to the table in ANNEX 1 subsection 2.2 (pp. 3-4). The fields in the part number table include information about the name, manufacturer, part number and part, and appliance approval. Additionally, the table should provide information on whether the part is installed or removed in the modification.

Another significant part of the change description is the rationale for the minor change classification recommended by the MCCGD (ANNEX 1, pp. 3). The classification criteria are complex and not discussed profoundly in this thesis. However, consideration of the classification induces modification suggestions to the EOM. A section for the classification rationale should be provided in the EOM, with the suggestions presented in the following paragraph. Additionally, the EOM guidance document should mention that the AMC to Part 21 (EASA 2012) p.41-60 with its amendments provide extensive guidance on the classification.

The rationale for the classification should account for the variables used in Minor Change. Hence, the variables to be considered are weight and balance, reliability, operational characteristics, operational suitability data and other characteristics affecting the airworthiness of the product or its environmental characteristics. For simplification purposes, the EOM section Weight and balance with optional sections Electrical load/Power consumption and Software upgrades/updates should be erased from the EOM. However, the EOM guidance document should encourage incorporating them in the EOM with other classification variables. Additionally, the EOM guidance document should contain a remark that the EASA is the final authority to decide the classification of the change, as described in section 3.1 of this thesis.

A part of the classification process is a safety assessment, often involved in the compliance demonstration. It provides information about any safety-critical areas of the modification. Therefore, if the change influences safety, the analysis and conclusions of the safety assessment should be provided to support the classification.

The requirements of the European Commission (Regulation 748/2021) do not require including the Safety Assessment to the minor change certification programme if other

methods deliver the demonstration of compliance. However, according to the European Commission Regulation (No 748/2012, 21.B.100 b), EASA determines the level of involvement by considering any novel and unusual features, the complexity of the design and compliance demonstration, and the criticality of the design and technology. The information for the consideration should be provided to EASA by the applicant. A logical area for the information would be the Safety assessment section of the EOM.

Other information to be incorporated in the description are the interface analysis and the effects on human factors. The interface analysis should be conducted if the installed equipment is interfaced with existing equipment. The effects on human factors should be described when the modification includes changes in the flight deck. If the conditions apply for the change, interface analysis and the effect on human factors should be included in the safety assessment section of the EOM. The conditions should be mentioned in the EOM guidance document.

Information and guidance on the safety assessment can be found in Society of Automotive Engineers (SAE) standard ARP4761 (1996). The EOM guidance document should mention the standard for guidance.

3.5 Determination of the certification basis

Under the Concurrent requirements section in the EOM, the type-certification, operational suitability data, and environmental protection requirements should be specified. Each of the bases should have respective subsections with an additional subsection for special conditions. European Commission Regulation (No 748/2012, 21.A.95) specifies that certification specifications that became after the certification basis in the type-certificate can be used for a minor change provided they do not affect the demonstration of compliance.

The EOM guidance document should remark that the aircraft's certification basis and special conditions are announced in the Type-Certificate Data Sheet. It should be further clarified that any later specifications elected to comply with should be entered and that later specifications should not be less restrictive than the current certification basis.

3.6 Embodiment and installation instructions

Although the European Commission does not require including the Embodiment and Installation instructions in the certification programme, their inclusion satisfies the Accepted Means of Compliance set for minor change approval by EASA. EASA (2019, p. 34) suggest creating instructions in the forms of service bulletins, modification bulletins

or production work orders. The instructions may include, for example, the installation procedure and the required material. In the Accomplishment instructions chapter, the guidance documents used in *the installation* should be described in a separate subsection. Guidance documentation used in *the compliance demonstration* should be provided in the compliance documents.

The Minor Change Certification Guidance Document (ANNEX 1, p. 8) further expands the installation instructions and considerations required to complete the physical modification. It proposes including verification of the compatibility of the configuration with the change in the instructions section. Additional verification that the installation is compliant with the appliance's intended environmental conditions is proposed to be described in the section. The verification should only assess the conditions during installation, as the Safety Assessment and compliance demonstration already identify hazards in the environmental conditions of the operations. The inclusion of the verification and the clarifying remark of the installation's environmental conditions should be stated on the EOM guidance document. A verification section should be inserted into the Accomplishment instructions -chapter of the EOM.

EASA (ANNEX 1, p.8) suggested information about required tooling, parts, materials and installation methods are already considered in the EOM sections: Equipment, tools or parts required per aircraft/component, Required materials, Equipment or parts to be returned, Special tools and Work steps. EASA further suggests including Access or preparation work and precautions in the installation instructions. For those, their respective sections should be created for the EOM.

Interpretation problems have occurred during previous modifications with the purposes of the sections in the previous paragraph. The EOM chapters Material information and Accomplishment instructions specify the *installation's* embodiment instructions, as the compliance documents already include required tools and work instructions for the compliance demonstration.

The EOM sections in the chapter Material information should be updated for simplification. The Required materials section should be divided into four sections: Parts, Equipment, Tools and Other. The EOM Compliance document should mention that in each of the sections, the identification, purpose regarding the change, and any other relevant information of the item should be described. The purpose might describe whether the item is to be installed, removed, modified, or used for measurement in the case of tools.

The Minor Change Certification Guidance Document (ANNEX 1, pp. 8) suggests entering information on whether the aircraft structure or any existing parts will be modified to

the installation instructions. The information is used for the classification of the change (EASA 2012, pp. 41-60), and thus the information is already considered in the Safety Assessment and classification rationale. Another purpose for the suggestion is to provide information on whether new placards are required. The requirements for placards of modified or manufactured equipment should be explained in the EOM guidance document as described in section 5.5 of this thesis. Additionally, the document should mention that EASA and FAA airworthiness specification paragraphs 1541-1565 detail further placard requirements for certification of various items. The required placards should be listed in the Placards and markings subsection of the Required materials section in the EOM.

3.7 Demonstration of compliance

The demonstration of compliance shall be in accordance with European Commission Regulation point 21.A.20. It introduces requirements for compliance with the certification basis and states that following the acceptance of a certification programme, the applicant shall demonstrate compliance with the certification basis. Additionally, it states that any difficulties or events encountered during the demonstration process affecting the level of involvement or the certification programme should be reported to EASA. According to European Commission Regulation (No 748/2021, 21.A.95 d), compliance with the operational suitability data basis may be demonstrated after minor change approval but must be demonstrated before the data is utilised. The conductor of the modification process should be informed about the obligation to inform EASA of any encountered difficulties in the Compliance section of the EOM guidance document.

The depth and scale of the demonstration are often challenging to determine. Florio (2016, pp. 48–50) states that airworthiness is not an exact science, and the airworthiness specifications are constructed in terms of economic reasonability, technological practicability, and aircraft type. He further explains that the engineer should be able to distinguish which specifications apply to the concept. Gratton (2018, pp. 3) complements that the level and means of demonstrating compliance are often subject to precedent and negotiation. Unless the applicant for a design adheres to the Means of Compliance set in industry standards and guidance documents, the applicant should verify that the selected means provide proof of compliance with the specifications or requirements (Garcia et al. 2019, pp. 1B3-8). The EOM guidance document should encourage the applicant to negotiate with EASA about the compliance requirements. Additionally, a recommendation to use industry standards or guidance documents in the compliance verification process should be included.

The European Commission Regulations (No 748/2012, 21.A.20 c) require that the justifications of compliance should be recorded in a compliance document referred to in the certification programme. The EOM can itself serve as a compliance document. However, when excluding simple modifications, the use of a separate compliance document is recommended. The systematic use of a separate compliance document supplementing the certification programme would standardise FBG's modification procedures, and a document template should be created to standardise the procedure further. The following chapter considers the contents of the compliance document.

4. COMPLIANCE DOCUMENT

The compliance document demonstrates that the concept satisfies all the requirements for certification. EASA states in the Acceptable Means of Compliance to Part 21 (2019, pp. 19) that each compliance document should generally reference the certification specification and substantiation data demonstrating compliance. Additionally, it should contain the statement that the document provides proof of compliance and an authorised signature. EASA further states that each compliance document should be identified by its reference and issue date. The European Commission Regulation (748/2012, 21.A.20) clarifies that with the proof of demonstrated compliance, the applicant shall declare that no feature or characteristic has been identified that may make the product unsafe.

The items inserted into the Finnish Border Guard's compliance document template should include the reference number, issue date, compliance table and the substantiation data. In addition, the template should contain a declaration that the document is proof of demonstrated compliance and that no unsafe features have been found. The declaration is confirmed by the authorised signature for which a field should be created. The contents of the compliance table are detailed in the following section.

4.1 Contents of the compliance table

Currently, the Engineering Order Modification incorporates a Compliance section. The compliance table in the section contains four columns: Requirement, Item, Means of Compliance and Compliant. A similar compliance table containing the specifications applicable in the demonstration should be reproduced in the compliance document.

The EOM guidance document should accompany the completion instructions in table 1.

Table 1. Completion instructions for the compliance table

Requirement	Item	Means of Compliance	Compliant
Insert identification and name of the specification in the certification basis	Item of the specification, i.e. "(a)" or "All".	Means of Compliance code as in Means of Compliance table. If an alternate method is used, provide a brief description of the method.	State the result of the demonstration, "Compliant" or "Non-compliant".

The Means of Compliance codes stated in table 1. are codes for means accepted by EASA for compliance demonstration (EASA 2019, pp.8). EASA further provides associated compliance documents for each of the codes. Table 2 presents the Means of Compliance Codes with the associated documents, and it should append the compliance document.

Table 2. Means of Compliance codes, reconstructed table (EASA 2019, pp. 8)

Type of compliance	Means of compliance	Associated compliance documents
Engineering evaluation	MC0: (a) compliance statement (b) reference to design data (c) election of methods, factors, etc. (d) definitions	(a) Design data (b) Recorded statements
	MC1: design review	(c) Descriptions (d) Drawings
	MC2: calculation/analysis	(e) Substantiation reports
	MC:3 safety assessment	(f) Safety analysis
Tests	MC4: laboratory tests	(g) Test programmes (h) Test reports (i) Test interpretations
	MC5: ground tests on related product(s)	
	MC6: flight tests	
	MC8: simulation	
Inspection	MC7: design inspection/audit	(j) Inspection or audit reports
Equipment qualification	MC9: equipment qualification	Note: Equipment qualification is a process that may include all previous means of compliance at equipment level

It is recommended to use the contents of table 2 in the compliancy document. However, due to the non-binding nature of the AMC document, their use is not mandatory.

The EOM document can be presented to EASA before the demonstration for certification programme approval. Hence, the EOM guidance document should clarify that the result of compliance cannot then be reported in the EOM compliance table. After the substantiation data in the signed compliance document has proven the compliances, the results should be inserted into the compliance table of the EOM. Section 4.2 describes data types that can be used for the substantiation.

4.2 Substantiation of the compliance

For each requirement specified in the compliance table, the applicant of a change should present substantiation data for the compliance in the compliance document. The Means of Compliance table presents recommended documents for the methods used for the demonstration. However, other documents may demonstrate the compliance if they provide enough information to determine the compliance.

According to EASA (2019, pp.8), when compliance demonstration involves testing, a description of the test articles, -methods, -locations, -houses and -conditions, as well as objectives of testing, should be provided. A table for the required test information should be constructed in the compliance document. European Commission Regulation (No 748/2012, 21.A.701, 21.A.771) complements that a permit to fly should be obtained from the competent authority if demonstration for minor change approval involves flight testing. According to the Finnish Aviation Act (Ilmailulaki 864/2014, 39 §), Traficom is competent to issue permits to fly in Finland. The EOM guidance document should remind the applicant to apply for a permit to fly when flight testing is involved.

When compliance demonstration involves analyses or calculations, a description of the tools and methods used, the associated assumptions, limitations and conditions should be provided with the purpose of the demonstration. Furthermore, validation and verification of the tools and methods should be addressed. (EASA 2019, pp. 8) The compliance document should include fields for the required information when the demonstration is completed by analysis and calculation.

Standard ARP4754 (2010, p. 82) propose analytical methods based on the existing data of the aircraft or items for compliance demonstration. If the existing certification data is not available or is not sufficient, it can be supplemented to support the certification of modifications to existing systems or systems. Furthermore, the supplemented data can support the certification if previously qualified items or systems are installed to a different concept.

When the existing certification data is used in an analysis, the data should be evaluated to determine which objectives require further compliance demonstration. Furthermore, the ARP4754 states that the compliance demonstration may be completed by reverse engineering or using service history of similar in-service items or systems. The applicant of a change should analyse the extent to which the service history is applicable.

The service history analysis should report that the problem reporting system was sufficient to determine that the history presents properly the service problems encountered. The increase in length of the service history increases the validity of the demonstration.

Nevertheless, the analysis should address that the referenced item or system did not alter the safety. Additionally, it should address that the service period of the item or system was correspondent with the intended usage of the modified system. If the operational environment differs between the reference item and the new or modified item, additional verification or validation should be performed. (ARP 4754 2010, p. 83) The analytical methods proposed in the ARP4754 should be briefly explained in the EOM guidance document.

4.3 Guidance documents for compliance demonstration

The applicant of a change should deliver detailed information for EASA about the proposed means of compliance for the level of involvement determination. EASA (2019, pp. 8) states that the information includes methodologies used for demonstration, such as industry standards, handbooks and other guidance materials. The compliance document should include a Specific guidance documents section.

Applicable industry standards are provided by:

- Society of Automotive Engineers (SAE),
- American Society for Testing and Materials (ASTM),
- European Organisation for Civil Aviation Equipment (EUROCAE) and
- AeroSpace and Defence Industries Association of Europe (ASD). (EASA 2019, pp. 8)

In addition to the Advisory Circulars, Acceptable Means of Compliance and Guidance Material explained previously, the Minor Change Certification Guidance Document (ANNEX 1, pp. 5) introduces Certification Memoranda (CM) as documents for guidance. The Certification Memoranda contain living documents that provide complementary information and guidance for compliance demonstration with current standards (EASA 2022, pp. 1).

Advisory Circulars FAA AC 43.13-1B and FAA AC 43.13-2B offer methods, practises and techniques for inspections, repairs and modifications. The latter applies only to aircraft under 12500 lbs (5443 kg) gross weight. A listing of the significant industry standards and standard providers should be inserted into the EOM guidance document to expedite the planning phase of the compliance demonstration.

5. OBLIGATIONS OF A MINOR CHANGE APPROVAL HOLDER

The Minor Change approval holder has obligations towards stakeholders that incorporate the Minor Change. The stakeholders include EASA, the production organisation, the organisation responsible for the continued airworthiness of the changed aircraft or appliance, as well as anyone incorporating the minor change. As the obligations are for the holder of already approved minor change, they do not present requirements for the certification programme or the change approval. However, the certification programme is a logical entity to introduce the requirements of the obligations.

European Commission states (Regulation (EU) No 748/2012, 21.A.109) that the holder of a minor change approval to a type certificate shall undertake the obligations laid in the following points of the Part 21 regulation:

- 21.A.4 Coordination between design and production
- 21.A.105 Record-keeping
- 21.A.107 Instructions for continued airworthiness
- 21.A.108 Availability of operational suitability data.

The four points above are expanded in the following sections with the additional obligation in 21.A.109 to specify the marking and European Part Approval (EPA) letters.

5.1 Coordination between design and production

According to point 21.A.4 of the European Commission Regulation (No 748/2012), *the holder of a change to a type-certificate* shall collaborate with the production organisation to ensure satisfactory coordination of the design and production. The point further refers to a collaboration requirement (European Commission Regulation (EU) No 748/2012, 21.A.133), which requires equally the *applicant of a production organisation approval* to have an appropriate arrangement with an applicant or a holder of a specific design. An additional purpose for the collaboration is to ensure the proper support of the continued airworthiness of the product, part or appliance.

For the demonstration of coordination between design and production organisations, EASA (2012, pp. 143-144) introduces an Arrangement Sample Form (ANNEX 2) with completion instructions. If assistance from a production organisation is required to demonstrate compliances, the Arrangement Sample Form can be utilised to substantiate

the agreement to the competent authority. Hence, the form should annex the EOM and the EOM guidance document to be used when required.

AMC to Part 21 (EASA 2012, 21.A.4) details the information on eligibility and approval status to be delivered from the design holder to production organisations. The information does not contain additional requirements for the certification programme. However, a section for coordination with production should be included in the EOM. The EOM guidance document should further comment that the applicant should provide information on how the coordination with production is arranged. Furthermore, it should encourage the applicant to refer to paragraph 21.A.4 of the AMC to Part 21 if a third party conducts the production.

EASA (2012, 21.A.4) additionally underlines the preference to use, as part identification, the part number given in Illustrated Parts Catalogue (IPC). Using the mentioned style in the certification programme would unify the styles between other documents. A remark on the IPC code usage should be inserted into the EOM guidance document.

5.2 Obligations for record-keeping

The European Commission (Regulation No 748/2012, 21.A.105) states that all the relevant design information, drawings and test reports, including inspection records for the changed product, shall be held and retained by the applicant for the disposal of EASA. The purpose is to ensure the continued airworthiness, operational suitability data and compliance with applicable environmental protection requirements of the changed product. No time limit for the record-keeping is specified in the regulation.

Currently, the EOM contains a Record of compliance section. The purpose of the section has not been evident in previous modification projects. The record-keeping obligation implies that the manner of the holding and retaining of the modification documents should be specified in the section. The purpose of the Record of compliance section should be clarified in the EOM guidance document.

5.3 Instructions for continued airworthiness

European Commission (Regulation (EU) No 748/2012, 21.A.107) states that the holder of a minor change approval shall provide instructions for continued airworthiness for the owner of the aircraft or appliance incorporating the minor change. Requirements for the continued airworthiness are introduced in ANNEX 1 (PART M) of the Commission Regulation No 1321/2012.

EASA supplements the Commission Regulation with AMC & GM to Part M (2015). The Instructions for continued airworthiness subsection in the EOM guidance document should mention the Commission Part M regulation and the AMC & GM to Part M document.

The regulations for continued airworthiness are broad and hence not considered in this thesis. The Finnish Border Guard is a Continued Airworthiness Maintenance Organisation, and the CAMO experience should be utilised to complete the Instructions for continued airworthiness subsection.

5.4 Availability of operational suitability data

European Commission (Regulation (EU) No 748/2012, 21.A.108) demands a minor change approval holder to provide changed operational data to all known EU operators of changed aircraft before the data is used. Further, the relevant data must be provided on request to the authority responsible for verifying the conformity of the affected data or any person required to comply with the operational suitability data.

The EOM includes a section for the changes in affected documents. An individual section should be reserved for the OSD changes only to emphasise and clarify the effect on operational suitability data. The EOM guidance document should differentiate the OSD documents: minimum pilot syllabus, the definition of the scope of the aircraft validation source data, minimum syllabus of maintenance certifying staff, type-specific data for cabin crew and the MMEL.

5.5 Part markings

When new parts or appliances are manufactured in the modification, each item should be marked with a name, trademark or symbol identifying the manufacturer. Furthermore, it should be marked with the part number and letters EPA if the production does not follow the approved design data belonging to the type-certificate holder. If EASA agrees that marking the part or appliance is impractical, the container or the authorised release document can be marked instead. An example of impracticability is the small size of the item. (Commission Regulation (EU) 21.A.804)

The required EPA markings should be detailed in the EOM subsection Placards and markings. The conditions for the markings should be described in the EOM guidance document.

6. SUMMARY

The European Commission requirements for the certification programme control the structure and contents of the Engineering Order – Modification document. The primary purpose of the certification programme is to show compliance with the certification basis set for the aircraft type. The regulations are supplemented with guidance documents and industry standards to guide the completion of the minor change approval process.

The *first* research problem of this thesis required an examination of how the EOM should be updated to satisfy the requirements of a certification programme. The research indicated that fundamental updates to the EOM document are the inclusion of rationale for minor change classification and the creation of a separate compliance document that includes the substantiation data for the regulation compliance. The rationale should contain a Safety Assessment to determine the hazards of the change and information for EASA to determine its involvement in the modification process.

Additionally, the examination suggests inserting non-binding recommendations about the obligations of the minor change holder into the EOM. The obligations include responsibilities for production coordination, record-keeping and continuing airworthiness. Additionally, clearer inclusion of the changes in operational suitability data and environmental protection requirements are suggested.

The *second* problem demanded clarification of any ambiguous elements of the EOM. For clarification, this thesis recommends the creation of an EOM guidance document and provides recommendations for the contents of the document. The recommendations guide the completion of the Safety Assessment, compliance document and installation instructions. The guidance document is important for the Finnish Border Guard modification process, as the regulative basis for the process is not previously documented.

The required depth of the compliance demonstration and means of compliance was the subject of the *third* problem. The research showed that all-encompassing answers could not be given for the required depth of the demonstration, as the requirements are situations specific. However, approved guidance documents listed in this thesis provide instructions for compliance with common modifications, and the use of the documents is highly recommended. The applicant is responsible for showing that the demonstration method is sufficient to prove conformity with the requirement if guidance documents are not available. It is further recommended to negotiate the extent of the demonstration with EASA early in the demonstration process.

This thesis specifies and explains the current certification programme regulations and obligations for any minor change application completed by any organisation that is not a recognised production or design organisation. Thus, it should support organisations or individuals in minor change application processes. The minor change applicants must conduct further study to indicate the applicable regulations of the certification basis. Furthermore, it must be recognised that regulations are due to change, and the amendments to the regulations mentioned in this thesis must be examined.

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ANNEX A: MINOR CHANGE CERTIFICATION GUIDANCE DOCUMENT

MINOR CHANGE CERTIFICATION DOCUMENT	Company logo
Doc Identifier + Issue	



MINOR CHANGE CERTIFICATION Programme FOR

<mod name> + <mod identifier>


**<Unique Doc identifier> + <Issue XX>
dd/mm/20aa**

Applicant Details:

(e.g. Company name, address, ADOA ref number if available ...)

Applicant Contact Details (Responsible Person for this Change)

(including name, position and signature)



This document is intended to assist applicants (especially non-DOA) in having a more uniform methodology for Minor Changes to General Aviation aircraft.

With the change introduced to part 21 by regulation EU 2019/897, a certification programme is mandatory for minor changes. This guidance document is one way of preparing a certification programme (but not the only way) for those applicants that wish to adopt it.

On the other hand, it will facilitate common understanding and it will promote an uniform approach. It is understood that in some cases where the change is more simple, several paragraphs can be marked as not applicable (N/A) without the need of further justification.

In case of uncertainty in classifying the change, please contact EASA, the competent NAA or the involved Qualified Entity.



Table of Contents

- 1 Document History3
 - 1.1 List of acronyms3
- 2 Description of change3
 - 2.1 Classification of change3
 - 2.2 Part Numbers3
 - 2.3 Interfaces4
 - 2.4 Operations4
- 3 Applicability4
 - 3.1 Current Limitations4
- 4 Certification Basis (CB)4
 - 4.1 Affected Requirements5
 - 4.2 Specific Guidance Documents5
- 5 Master Document List (MDL)6
- 6 Structural Considerations6
- 7 Aircraft Flight Manual (AFM) Impact7
- 8 Weight and Balance Impact7
- 9 Wiring Considerations7
- 10 Electrical Load Analysis Impact7
- 11 Installation Considerations and Verification7
 - 11.1 Service Bulletins (SB)8
- 12 Testing8
 - 12.1 EMC/EMI Testing8
 - 12.2 Ground Testing8
 - 12.3 Flight Test and Check Flights9
- 13 Instructions for Continued Airworthiness Impact9
- 14 Operational Suitability Data Impact9
- 15 Other possible impacted areas10
- 16 Declaration of compliance10
- 17 Minor Change approval holder obligations10
- 18 Appendix A10

MINOR CHANGE CERTIFICATION DOCUMENT

Company logo

Doc Identifier + Issue

1 Document History

Issue	Date	Change
A	dd/mm/20aa	Initial Issue

1.1 List of acronyms

Include here all the acronyms used in the document

2 Description of change

Describe comprehensively the change in accordance with point 21.A.93 (b)(1)(2).

Include some schematics/pictures if necessary, for a better understanding. Explanation of the purpose of the modification is likely to be advantageous. Identify the locations of removed and of installed equipment and components. Where changes are made to the flight deck, provide sufficient information to assess human factors aspects.

Describe also in detail other design changes that are a pre-requisite for this change. This description shall take into consideration the limitation and conditions of the applicable design changes and an analysis of the interfaces shall be performed

2.1 Classification of change

Provide a rationale for the classification as minor (in accordance with guidance material for 21.A.91).

NOTE: The Appendix A to the Guidance Material for 21.A.91 includes examples of Major Changes grouped per discipline. These cases should be reviewed and assessed taking into considerations all the aspects (i.e. structure, cabin safety, powerplant, flight, environmental and systems).

NOTE: Few minor changes cases may require to have some considerations related to the Safety Assessment, in these cases analyses and conclusions shall be reported here supporting the classification.

NOTE: please also consider that standard changes defined in CS-STAN can already cover your case and an application for a design change is not required. On the other hand, it is not expected that CS STAN are used to approve minor changes.

2.2 Part Numbers

List here all the relevant P/N removed and installed (including their (E)TSO approvals)

I / R ¹	Name & Manufacturer	P/N	Part & Appliance Approval

¹ I = Installed R = Removed

2.3 Interfaces

If the newly installed equipment is interfaced with other existing equipment on the A/C a description or list/schematic should be provided.

2.4 Operations

Identify the type of operations of the A/C (VFR, IFR or VFR Day only). The minor change cannot extend the type of operations approved for any single A/C.

3 Applicability

List here applicable types, models and/or serial numbers (if relevant) including reference to the applicable TCDS.

Type	
Model(s)	
S/N ²	
TCDS	

3.1 Current Limitations

Identify any limitation which might be applicable for the minor change approval (e.g. VFR only, no precision approach, etc.). In case of doubt, note "TBD" and check with the PCM.

4 Certification Basis (CB)

Identify here the aircraft CB (e.g. CS-23 Amdt 3, FAR 23 Amdt 62). Please consider that for minor changes, the certification basis is the one of the original product as identified in the TCDS. If you want to apply later amendment of the certification specifications in the TCDS, please briefly clarify the rationale (as per point 21.A.95(c)).

Note : Please consult the EASA Website for information on the TCDS

1 - EASA issued TCDS - <https://www.easa.europa.eu/document-library/type-certificates>

2 - EASA accepted products and TCDS List (- <https://www.easa.europa.eu/document-library/product-certification/type-certificates/easa-product-lists>)

Note – for the case 2 above and since EASA did not issue a TCDS, a consultation of the website of the primary certification authority will have to be performed (for example FAA - https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgMakeModel.nsf/Frameset?OpenPage)

² In case the change is limited to one or few S/N, specify them. Otherwise, include the note "all" or the applicable batches or the characteristics required and provide the S/N for the first installation. Moreover in case of applicability to a big number of S/N (e.g. "all", batches) a rationale should be provided to substantiate the applicability range.

4.1 Affected Requirements

Taking into consideration the proposed change and reviewing the requirements identified in the previous paragraph determine what paragraphs are affected by the change

After all requirements for which compliance needs to be show are identified, you will need to determine how this is going to be demonstrated (the bellow tables may be used for that purpose).

The final step it to provide the compliance statement, considering the MOC (see appendix A) selected.

Provide in the following table list of the Certification Basis affected paragraph, together with the means of compliance used and the evidence(s) produced.

Para. & Amdt.	Paragraph Title / Description	MOC ³	Compliance Statement / Document / Remarks
Subpart A			
§.XXXX			
Subpart B			
Subpart ...			

4.2 Specific Guidance Documents

List here any further document that is used for compliance / installation (e.g. ACs, AMCs, CM, GM⁴ and Equipment Manufacturer Installation Manual) - see also EASA GA FAQ.

³ Advisory: Provide identification of the Means of Compliance (MOC) used. It is possible to use the conventional MOC codes see appendix A or AMC to 21A15b

⁴ AC – (FAA) Advisory Circular, AMC – Acceptable Means of Compliance, CM – Certification Memoranda, GM – Guidance Material

Identify also any additional guidance material that can be followed. The EASA website on Certification Memoranda can also be used as a source of information <https://www.easa.europa.eu/document-library/public-consultations/certification-memoranda>)

It is assumed that for many cases it is convenient for the Applicant to produce separated documents to cover the different aspects (at least for some) described in Sections 4, 5, 7, 8, 9, 10, 11 and 13.

Nevertheless, whether the applicant decides to include completely these aspects in the "Minor Change Certification Document", this approach is considered acceptable provided that all the required information are included.

If these are impacts on Sections 6 and 12 which require additional information to be provided, a separate document shall be provided for this in any case in order to facilitate the flight and maintenance operations. These supplements shall be added respectively to the AFM and ICA.



5 Master Document List (MDL)

List all the documentation produced for the change. Moreover, whether the content of the document cannot be immediately derived from the title a short description might be of help.

NOTE: All the relevant documents produced shall be controlled (i.e. have a doc number, a title, an Issue/Revision and a date) and duly signed. Moreover, it is reminded that any document prepared in the framework of this project (and required for its approval) have to be completed, signed and agreed with the PCM prior of the Minor Change approval.

Alternatively, a reference to the MDL produced is also acceptable (despite a separate MDL is not mandatory for minor changes, due to the intrinsic non complexity of the project).

6 Structural Considerations

In the cases when changes to the structure are required, provide a comprehensive description here, including all the necessary details and drawings. Following the identification of the affected requirements in Section 3.1 specify how compliance is shown⁵.

⁵ The approach described in FAA AC 43.13-2B is considered acceptable, if adequately adapted to the applicable certification basis.

In case details are provided in separate documents, provide here a high level description of the change and methods along with the references to the appropriate structural documents.

7 Aircraft Flight Manual (AFM) Impact

Describe here the content of the change(s)/supplement to the flight manual related to this application referring also to the AFM Supplement produced.

NOTE: The AFM Supplement shall describe also all the limitations placards defined for this minor change that have to be installed in the cockpit.

8 Weight and Balance Impact

List here the calculated weight and balance differences with regards to the previously approved configuration⁶. When applicable the note to update the relevant Section of the AFM shall be included (refer also to Section 6).

Alternatively, reference to the specific document/supplement is also acceptable.

NOTE: As part of the change classification assessment, the impact of the weight change on the aircraft's approved noise levels shall be taken into account. A change to a weight for which EASA has not approved noise levels may lead to a Major Change classification. In case of doubt, please contact the EASA Environment Department (noise@easa.europa.eu).

9 Wiring Considerations

Describe here the changes in the wirings and provide simple schematics, when applicable refer also to the Wiring Diagram Manual (WDM) document. As relevant, provide information on routing of wiring, protective devices (circuit breakers), and type/gauge of wiring.

Alternatively, references to the specific documents/drawings are also acceptable.

10 Electrical Load Analysis Impact

Provide here the calculated⁷ electrical loads for the new configuration and highlight the differences with the previously approved one⁸. The calculation should conservatively account the most critical consumption. When applicable the note to update the relevant Section of the AFM shall be included (refer also to Section 6).

Alternatively, reference to a specific ELA document is also acceptable.

⁶ The effect on weight needs to be calculated and the result reported in the Aircraft Flight Manual Supplement (AFMS). If there is no appreciable difference, this must be stated here and the AFMS will report in the weight section "no change" (e.g. an appreciable difference could be one which does change the power required for take-off more than 1%+2% according also the precision of the power reading instrument).

⁷ As described in the FAA AC 43.13-1B it is also acceptable that the electrical load is physically measured on the aircraft after installation instead of providing the calculated values.

⁸ If the new load consumption is higher than before, it must be assessed if this is affecting the available power (this assessment shall be done considering all other consumptions at their maximum value). In some cases it can be necessary to make this verification for each installation and provide means to the installer to assess the acceptability of the changed current consumption.

11 Installation Considerations and Verification

Provide here the drawings, specification (if needed), installation instructions and considerations required for the completion of the physical modification, including:

- Verification that the existing aircraft configuration is compatible with the proposed design changes before embodiment begins (checking also that all the applicable approved documentation is in line with the specific aircraft configuration)
- Verify that the intended installation meets the environmental conditions for which an equipment or part has been designed (e.g. temperature, height, vibrations)
- Access or preparation work
- Special precautions
- Required tooling, test equipment or aircraft/equipment manufacturer's data
- Parts to be manufactured
- Parts or equipment to be fitted (by part number) including location and the associated methods of attachment/installation
- Required materials
- Modification to existing aircraft parts or structure
- Required placards

Refer also to all the installation/guidance documents used, if not already reported in Section 3.2.

NOTE: In case the change is performed by a Third Party it shall be stated that all the instruction included in this section shall be available to the Third Party.

11.1 Service Bulletins (SB)

Include the reference to the SB produced (if any produced or foreseen) or used (from the equipment manufacturer).

12 Testing

NOTE: All flight and ground test shall be prepared in accordance with the applicable rules and equipment manufacturer recommendations as listed in the installation manual.

12.1 EMC/EMI Testing

Description and results of the EMC/EMI testing activities performed (if applicable).

Alternatively, reference to a specific EMC/EMI test procedure and report document is also acceptable.

12.2 Ground Testing

Description and results of the ground test activities performed.

Alternatively, references to specific Ground Test procedure(s) and report(s) document are also acceptable.

12.3 Flight Test and Check Flights

Most Minor Changes do not require flight test activities. Nevertheless, few of them could require a small flight test activity to show compliance (e.g. small calibration, antenna patterns in avionic changes or reduced flight test with no safety risk). This is a case by case decision to be agreed with the Agency and/or the assigned PCM and the flight test results shall be part of the certification documentation. To perform these flights the Applicant needs to Apply for a Permit to Fly to the local competent Authority and requests the Flight Conditions to be approved by EASA, as prescribed by 21.A.710 and related Guidance Material. Moreover, in few cases a check flight might be envisaged in order to assess the good functioning of the equipment after the Change approval. In this case, no Permit to Fly and Flight Conditions shall be requested, since the design is already considered as approved (Check Flights shall occur after the Minor Change approval as they do not provide compliance).

In both the cases above a description of the test/check objectives and relative procedures shall be provided here or, alternatively, references to a specific document is also acceptable

13 Instructions for Continued Airworthiness Impact

Include the reference to the ICA documentation produced if required. In many cases it is adequate to refer to the maintenance instructions of the equipment manufacturer. On a general level, the ICA may include some (or all) of the following:

- Instructions on the removal and installation of equipment which may fail or otherwise need replacement during service (including subsequent testing)
- Any instructions necessary for access
- Instructions on and frequency of any required scheduled maintenance
- Instructions on and parts required for any servicing (e.g. charging, lubrication)
- Details of any tooling or test equipment
- Details of any supplementary data such as equipment or aircraft manufacturers instruction manuals
- Details of any Airworthiness Limitations (despite this would normally raise a major classification. The Agency/PCM shall finally agree)

14 Operational Suitability Data Impact

Include here the assessment, description and reference to the Operational Suitability Data (OSD) if there is an impact as per point 21.A.95(b)(2).

Definition of the OSD is provided in the requirement 21.A.15(d) and related GMs.

NOTE: Following the introduction of the European Commission Regulation No 69/2014 in January 2014, the EASA Part 21 has been modified in order to include the OSD in the Type Certification processes and the subsequent changes. Point 21.A.95(b)(2) prescribes that even for Minor Changes an assessment of the impact on OSD shall be performed by the applicant and, if impacted, data shall be made available in accordance with point 21.A.108.

In accordance with point 21.A.(d) a minor change to an aircraft type-certificate may be approved before compliance with the operational suitability data certification basis has been demonstrated, provided that the applicant demonstrates such compliance before the date at which those data are actually used.

For most of the General Aviation fleet this section will be not applicable in the nearest future, nevertheless it is important to make the assessment if there is any impact.



15 Other possible impacted areas

Include here the description and reference to other areas where it is believed to have an impact (in line with the interfaces identified in Section 2.3).

Alternatively, references to the appropriate documents are also acceptable.

16 Declaration of compliance

The applicant should provide a statement in accordance with point 21.A.95(e).

17 Minor Change approval holder obligations

The certification specification affected have been met as shown in this document. The document is ready for approval by the Agency. It is hereby confirmed that the holder of this minor change is aware and ready to discharge her/his obligations according to 21.A.109.

18 Appendix A

Type of Compliance	Means of Compliance	Associated Compliance Documents
Engineering Evaluation	MC0 : Compliance statement – reference to TD documents – election of methods, factors – definitions	Type Design Documents Recorded Statements
	MC1 : Design Review	Description, Drawings
	MC2 : Calculation/Analysis	Substantiation Reports
	MC3 : Safety Assessment	Safety Analysis
Tests	MC4 : Laboratory Tests	Test Programmes
	MC5 : Ground Tests on related product	Test Reports
	MC6 : Flight Tests	Test Interpretations
	MC8 : Simulation	
Inspection	MC7 : Design Inspection	Inspection Reports
Equipment Qualification	MC9 : Equipment Qualification (e.g. ETSO)	Reference to existing approvals and their applicability

ANNEX B: ARRANGEMENT SAMPLE FORM

ARRANGEMENT in accordance with 21.A.122	
The undersigned agree on the following commitments:	Relevant interface procedures
<p>The design organisation <i>[NAME]</i> takes responsibility to:</p> <ul style="list-style-type: none"> • assure correct and timely transfer of up-to-date applicable design data (e.g., drawings, material specifications, dimensional data, processes, surface treatments, shipping conditions, quality requirements, etc.) to the person producing under Part 21 Subpart F <i>[NAME]</i> • provide visible statement(s) of approved design data. 	
<p>The person producing under Part 21 Subpart F <i>[NAME]</i> takes responsibility to</p> <ul style="list-style-type: none"> • assist the design organisation <i>[Name]</i> in dealing with continuing airworthiness matter and for required actions • assist the design organisation <i>[NAME]</i> in case of products prior to type certification in demonstrating compliance with certification specifications • develop, where applicable, its own manufacturing data in compliance with the airworthiness data package. 	
<p>The design organisation <i>[NAME]</i> and the person producing under Part 21 Subpart F <i>[NAME]</i> take joint responsibility to:</p> <ul style="list-style-type: none"> • deal adequately with production deviations and non-conforming parts in accordance with the applicable procedures of the design organisation and the manufacturer producing under Part 21 Subpart F. • achieve adequate configuration control of manufactured parts, to enable the manufacturer producing under Part 21 Subpart F to make the final determination and identification for conformity. 	
<p>The scope of production covered by this arrangement is detailed in <i>[DOCUMENT REFERENCE/ATTACHED LIST]</i></p> <p><i>[When the design organisation is not the same legal entity as the manufacturer producing under Part 21 Subpart F]</i></p>	
<p>Transfer of approved design data:</p> <p>The TC/STC/ETSO authorisation holder <i>[NAME]</i> acknowledges that the approved design data provided, controlled and modified in accordance with the arrangement are recognised as approved by the competent authority and therefore the parts and appliances manufactured in accordance with these data and found in a condition for safe operation may be released certifying that the item was manufactured in conformity to approved design data and is in a condition for safe operation.</p> <p><i>[When the design organisation is not the same legal entity as the manufacturer producing under Part 21 Subpart F]</i></p>	
<p>Direct Delivery Authorisation:</p> <p>This acknowledgment includes also <i>[OR does not include]</i> the general agreement for direct delivery to end users in order to guarantee continued airworthiness control of the released parts and appliances.</p>	
<p>For the <i>[NAME of the design organisation/DOA holder]</i></p> <p>Date: xx.xx.xxxx</p> <p style="text-align: right;">Signature: (<i>[NAME in block letters]</i>)</p>	<p>For the <i>[NAME of the person producing under Part 21 Subpart F]</i></p> <p>Date: xx.xx.xxxx</p> <p style="text-align: right;">Signature: (<i>[NAME in block letters]</i>)</p>