



ICAO

Doc 10146

Manual on Airworthiness Approvals for Changing Aircraft Cabin Interiors

First Edition, 2020



Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION



| ICAO

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FOREWORD

A need was identified for the development of guidance material related to the certification requirements for the airworthiness of commercial aircraft undergoing changes to the aircraft cabin interiors. Such cabin modifications could include simple or complex changes regarding aircraft with passenger, combi- and all-cargo configurations.

The policies and procedures for approval of modifications and repairs to an aircraft cabin may be different among States due to the differences in existing national aviation legislation and regulations.

This manual, developed by a group of regulators and industry subject matter experts, provides additional information on airworthiness-related provisions for States wishing to establish or enhance their system of approval for such modifications and provides information to industry stakeholders, facilitating the effective implementation of such provisions relating to cabin changes in the future.

Comments on this manual, particularly with regard to its application and usefulness, would be appreciated from all States and ICAO Technical Cooperation field missions. These will be taken into consideration in the preparation of subsequent editions. Comments concerning this manual should be addressed to:

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GLOSSARY

DEFINITIONS

When the following terms are used in this manual, they have the meanings shown. Specific definitions found in Annex 6 — *Operation of Aircraft* and Annex 8 — *Airworthiness of Aircraft* are reproduced to facilitate their use in this manual. The additional definitions are appropriate to use in this document only.

Aeronautical product. Any aircraft, aircraft engine, aircraft propeller or a part to be installed thereon.

Airworthiness Directive (AD). A regulatory document which identifies aeronautical products in which an unsafe condition exists, and where the condition is likely to exist or develop in other aeronautical products of the same type design. It prescribes mandatory corrective actions to be taken or the conditions or limitations under which the aeronautical products may continue to be operated. The AD is the common form of mandatory continuing airworthiness information mentioned in Annex 8.

Airworthiness Standards. Detailed and comprehensive design and safety criteria applicable to the category of the aeronautical product (aircraft, engine and propeller) that satisfy, at a minimum, the applicable Standards of Annex 8.

Applicant. An individual or organization, or their representative, responsible for the design or modification of an aeronautical product, making application for the issuance of, or a change to, a design approval of an aeronautical product.

Appropriate airworthiness requirements. The comprehensive and detailed airworthiness codes established, adopted or accepted by a Contracting State for the class of aircraft, engine or propeller under consideration.

Approved maintenance organization. An organization approved by a Contracting State, in accordance with the requirements of Annex 8, Part II, Chapter 6 — Maintenance Organization Approval, to perform maintenance of aircraft, engine, propeller or associated parts and operating under supervision approved by that State.

Note.— *Nothing in this definition is intended to preclude that the organization and its supervision be approved by more than one State.*

Bilateral Airworthiness Agreement. An executive agreement concluded through an exchange of diplomatic notes between a Contracting State and its foreign counterpart.

Bilateral Aviation Safety Agreement. A formal agreement providing for bilateral cooperation in a variety of aviation areas, including maintenance, flight operations, and environmental certification. For aircraft certification, an additional document, an Implementation Procedures for Airworthiness, is developed to address specific subject areas under the terms of the agreement.

Certification basis. The applicable airworthiness and environmental standards established by a State as the basis by which the type design of an aeronautical product, or change to that type design, is approved or accepted. The certification basis may also include special conditions of airworthiness, findings of equivalent level of safety, and/or exemptions when determined by the State to apply to the type design.

Certification Compliance Plan. The certification compliance plan is the primary document in the modification approval process that serves both as a checklist and an official record of the intended method of compliance.

Combi aircraft. An aircraft that can be readily configured to carry either passengers or cargo as a freighter. Some Combi aircraft include a certificated passenger and a certificated cargo compartment on the same deck and may have a partition installed in the cabin to allow both uses at once. Combi aircraft may feature an oversized cargo door and frequently have specialized tracks on the cabin floor to permit the quick change of the cabin configuration.

Continuing airworthiness. The set of processes by which an aircraft, engine, propeller or part complies with the applicable airworthiness requirements and remains in a condition for safe operation throughout its operating life.

Equivalent level of safety. As used in type certification, a finding where literal compliance with a specific airworthiness requirement cannot be demonstrated but compensating factors exist in the type design that can be shown to provide a level of safety equivalent to that intended by the certification basis.

Exception/Exemption. A relief from compliance with the requirement(s) of airworthiness or environmental standards, or operating rules, based on the determination by a civil aviation authority that granting such relief will not adversely affect safety.

Implementation Procedures for Airworthiness. A procedural document authorized by the BASA Executive Agreement for design approval, production activities, export airworthiness approvals, post-design approval activities and technical assistance between authorities. This document defines the scope for civil aeronautical products and parts eligible for import into the Contracting State and the counterpart BASA signatory country. It further defines the interface requirements and procedures between the authorities for validation, import and continued support of those civil aeronautical products and articles.

Maintenance. The performance of tasks on an aircraft, engine, propeller, or associated part required to ensure the continuing airworthiness of an aircraft, engine, propeller or associated part including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or a repair.

Maintenance programme. A document which describes the specific scheduled maintenance tasks and their frequency of completion and related procedures, such as a reliability programme, necessary for the safe operation of those aircraft to which it applies.

Major modification. In respect of an aeronautical product for which a type certificate has been issued, a change in the type design that has an appreciable effect, or other than a negligible effect, on the mass and balance limits, structural strength, engine operation, flight characteristics, reliability, operational characteristics, or other characteristics or qualities affecting the airworthiness or environmental characteristics of an aeronautical product.

Mandatory Continuing Airworthiness Information (MCAI). The mandatory requirements for the modification, replacement of parts, or inspection of aircraft and amendment of operating limitations and procedures for the safe operation of the aircraft. Among such information is that issued by Contracting States in the form of airworthiness directives.

Master minimum equipment list (MMEL). A list established for a particular aircraft type by the organization responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

Minimum equipment list (MEL). A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

Minor modification. A modification other than a major modification.

Modification. A change to the type design of an aircraft, engine or propeller.

Note.— A modification may also include the embodiment of the modification which is a maintenance task subject to a maintenance release. Further guidance on aircraft maintenance — modification and repair is contained in the Airworthiness Manual (Doc 9760).

Repair. The restoration of an aircraft, engine, propeller or associated part to an airworthy condition in accordance with the appropriate airworthiness requirements after it has been damaged or subjected to wear.

State of Design. The State having jurisdiction over the organization responsible for the type design.

State of Design of Modification. The State having jurisdiction over the individual or organization responsible for the design of the modification or repair of an aircraft, engine or propeller.

State of Registry. The State on whose register the aircraft is entered.

Note.— In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Chicago Convention, attach to a State of Registry. See, in this regard, the Council Resolution of 14 December 1967 on Nationality and Registration of Aircraft Operated by International Operating Agencies which can be found in Policy and Guidance Material on the Economic Regulation of International Air Transport (Doc 9587).

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Structural integrity programme. The continuing structural integrity programme should be initiated by the type design organization and developed jointly with representatives of air operators and airworthiness authorities. The authority in each State of Registry having aeroplanes affected should determine how, and to what extent, the substance of the programme is made mandatory, consistent with the State of Registry's own experience with the aeroplane and its procedures for enforcement of continuing airworthiness requirements.

Type certificate. A document issued by a Contracting State to define the design of an aircraft, engine or propeller type and to certify that this design meets the appropriate airworthiness requirements of that State.

Note.— In some Contracting States a document equivalent to a Type Certificate may be issued for an engine or propeller type.

Type design. The set of data and information necessary to define an aircraft, engine or propeller type for the purpose of airworthiness determination.

ABBREVIATIONS

When the following abbreviations and acronyms are used in this manual, they have the meanings shown.

AD	Airworthiness directive
AED	Airworthiness engineering division
AFM	Aircraft flight manual
AMM	Aircraft maintenance manual
AMO	Approved maintenance organization
BAA	Bilateral airworthiness agreement
BASA	Bilateral aviation safety agreement

CAA	Civil aviation authority
CCP	Certification compliance plan
CMM	Component maintenance manual
CofA	Certificate of Airworthiness
CVE	Certification verification engineer
DER	Designated engineering representative
DOA	Design organization approval
EASA	European Union Aviation Safety Agency
E-UM	Engineering Unit Member
FAA	Federal Aviation Administration
IATA	International Air Transport Association
ICA	Instruction for continuing airworthiness
ICAO	International Civil Aviation Organization
IFE	In-flight entertainment
IPA	Implementation procedures for airworthiness
IPC	Illustrated parts catalogue
MCAI	Mandatory continuing airworthiness information
MEL	Minimum equipment list
MMEL	Master minimum equipment list
ODA	Organization designation authorization
RSOO	Regional safety oversight organization
SARPs	Standards and Recommended Practices
SB	Service bulletin
SIP	Structural integrity programme
SME	Subject matter expert
SRM	Structural repair manual
STC	Supplemental type certificate
TC	Type Certificate
TCDS	Type certificate data sheet
TD	Type design
WDM	Wire diagram manual

REFERENCES

International Civil Aviation Organization (ICAO)

Convention on International Civil Aviation, signed at Chicago on 7 December 1944 and amended by the ICAO Assembly (Doc 7300)

Annex 6 — *Operation of Aircraft*

Part I — *International Commercial Air Transport — Aeroplanes*

Part II — *International General Aviation — Aeroplanes*

Part III — *International Operations — Helicopters*

Annex 8 — *Airworthiness of Aircraft*

Doc 9760 — *Airworthiness Manual*

Others*Hong Kong (SAR) Civil Aviation Department*

Application for validation of supplemental type certificate (VSTC) DCA-539

European Aviation Safety Agency (EASA)

Doc. PR.CERT.00001-002

Template for Certification Programme ETSO

GM 21A.101 Establishment of the type-certification basis of Changed Aeronautical Products

Installation of Cargo Seat Bags on Passenger Seats CM-CS-003

Federal Aviation Administration (FAA)

Advisory Circular No. 21-40 as revised

Advisory Circular No. 21.101 as revised

Advisory Circular No. 20-188 as revised

Type Certification Order 8110.4 as revised

Advisory Circular No. 21-51 as revised

Advisory Circular No. 120-85 as revised

India

Directorate General of Civil Aviation Form CA-33

International Air Transport Association

Best Practices Guide Cabin interior retrofits and entry into service program

Japan Civil Aviation Bureau (JCAB)

Procedures for Type Certification of Japanese Manufactured Aircraft, Circular No. 1-003

New Zealand Civil Aviation Authority

Advisory Circular AC21-8, Appendix A

Chapter 1

INTRODUCTION

1.1 This publication contains information for regulatory authorities to ensure the continuing airworthiness of aeroplanes in commercial operations that have been subjected to an interior modification programme which affects the aircraft airworthiness certification and potentially cabin operational safety. Interior upgrades may often require different maintenance and/or refurbishment cycles that may not be aligned with the aircraft scheduled maintenance cycle. The information in this document regarding the process for the approval of modifications may be of value to both operators and regulators for aircraft of various sizes and types.

1.2 Design standards of cabin interiors have evolved over time. Industry innovation may be ahead of existing national regulatory requirements. In addition, ICAO Standards, State of Registry regulations and associated guidance may often be misunderstood, misapplied, unclear or subjected to inconsistent interpretation by both regulators and/or the aviation industry.

1.3 Effective ongoing communications between the operator and the civil aviation authority (CAA) of the State of Registry should be a top priority during the initial planning and the performance of a cabin change/modification.

1.4 A State has a duty to satisfactorily discharge its international obligations and responsibilities for aircraft airworthiness by establishing and implementing a system of safety oversight. However, some States, particularly those still in the early stages of establishing an effective CAA, may require assistance.

1.5 The policies and procedures for approval of modifications and repairs may be different from one State to another due to differences in national aviation legislation and regulations. All States are encouraged to give maximum credit and recognition to the modification approvals granted by the State of Design or another State that has proven technical capability to avoid duplication or redundant testing, where practical, and without prejudice to their unique national requirements. Specific information regarding modifications and repairs are provided in the ICAO *Airworthiness Manual* (Doc 9760), Part III, Chapter 8.

1.6 *Use of the guidance material in this manual.* This manual provides guidance to States in their development of detailed and comprehensive national codes with a view to introducing uniformity of those national codes. The material has no mandatory status and States have the option to deviate, either in detail or in method. States are not required to notify of any differences that may exist between their detailed national regulations and practices and the relevant material in this manual.

1.7 As the guidance material provided in this manual makes specific references to material that may become dated, a list of potential sources of additional and more detailed information is provided in the reference section of this manual.

Chapter 2

BACKGROUND

2.1 CURRENT AIRCRAFT CABIN UPGRADE TRENDS

2.1.1 Commercial aircraft interior upgrades are complex and continue to evolve with new technology. Modifying and upgrading aircraft interiors poses several challenges, including (but not limited to) technical, regulatory, operational, financial, logistical, project implementation and schedule challenges.

2.1.2 Several different stakeholders may have been involved in the design, certification, manufacture and installation of components of a typical aircraft interior. Stakeholders that may be a part of a cabin change project and need a specific certification should be identified. The interior installed in the aircraft must meet applicable certification requirements, operate reliably and provide safety and comfort. The in-service product desired by the operator must meet service and passenger experience expectations. From an airworthiness perspective, the interior must meet minimum airworthiness Standards to protect crew and passengers from potentially unsafe conditions that may occur during flight, while offering occupants the best possible chance of evacuating an aeroplane in the event of an accident.

2.1.3 Interiors of commercial aircraft may be worn out by passengers and crew during the normal course of business, and changes or refurbishment of an aircraft interior can be a complex undertaking for an operator. Depending on the scope of the project, it may be necessary to invest a significant amount of resources in upgrading a cabin interior.

2.1.4 Such interior upgrades often may require different maintenance and/or refurbishment cycles that may not be in line with the aircraft scheduled maintenance cycle. Some airlines may upgrade their cabin products every five to seven years, while others may keep a current cabin configuration in operation for twenty years or more. During this time, it can be expected that parts within the cabin will be changed under normal maintenance. The lifecycle of a cabin upgrade or change will also vary depending on the interior product type. Passenger seating, passenger connectivity and in-flight entertainment (IFE) may be upgraded more frequently than overhead bins, galleys or lavatories, which some operators may never replace but keep serviceable through overhauls and regular maintenance.

2.2 AIRWORTHINESS RESPONSIBILITIES OF STATES

2.2.1 Article 33 of the Chicago Convention places the burden on the State of Registry to recognize and/or render valid an airworthiness certificate issued by another State. Such action is subject to the condition that airworthiness requirements under which a certificate is issued or rendered valid are equal to or above the minimum Standards established by ICAO pursuant to the Chicago Convention. These minimum Standards are contained in Annex 8 — *Airworthiness of Aircraft*.

2.2.2 Annex 8 provides broad Standards that serve as the basis for national regulations and codes of airworthiness needed to certify an aircraft. Each State may develop its own comprehensive and detailed code of airworthiness or accept the detailed code of airworthiness established by another State.

2.2.3 The airworthiness code determines the type certification basis of an aircraft type or variant. The amendment level is then applicable indefinitely for the duration that a Type Certificate (TC) is valid. The State of Design that certified the aircraft type will issue the type certificate data sheet (TCDS). Other States of Registry may issue, validate or accept

the TCDS issued by the State of Design. Safety improvements that result from in-service experience and specific to the aircraft type or variant are introduced by means of Mandatory Continuing Airworthiness Information (MCAI) (also known as Airworthiness Directives (ADs)). The applicant must determine if there is applicable MCAI issued against that portion of the type design (TD) intended to be modified, both from the State of Design as well as the current State of Registry.

2.2.4 The airworthiness codes themselves may also be amended to reflect safety improvements that are more generic in nature rather than specific to a certain type or variant. Regulatory amendments that are applicable after the certification of the aircraft type established during type certification normally will not affect that aircraft type unless there is a newly published safety issue, or changes to the TD dictate incorporation of later amendments based on the State's certification process. Some of these regulatory amendments and safety improvements may be considered important enough that a State of Registry may make them mandatory for type-certificated aircraft. Examples of these safety improvements include enhanced fire protection requirements for aircraft seats, cabin interiors, cargo compartments and thermal/acoustic insulation material, fuel tank inerting systems, improved access to emergency exits and improved crashworthiness of seats. States have different regulatory means to do this, with some States issuing "additional airworthiness requirements", while others incorporate post-type certification requirements in operational requirements. In addition, there are situations where an aircraft design was modified so extensively that, for example, under the Federal Aviation Administration (FAA) requirement Title 14, CFR 21.101 — "Changed Product Rule", the entire aircraft design or a significant (affected) portion of the aircraft was upgraded to a new amendment level. Another example is the certification requirements defined in the European Union Aviation Safety Agency (EASA)'s guidance material GM 21A.101 Establishment of the type-certification basis of Changed Aeronautical Products, which is harmonized with those of the FAA. In-depth research of the TCDS is required to identify design configurations associated with the certification basis that need to be addressed.

2.2.5 For the States of Design that normally develop approved TCDS, a qualified interior expert, recognized as a Designated Engineering Representative (DER), or an Engineering Unit Member (E-UM) if the qualified interior expert is part of an organization that holds an FAA Organization Designation Authorization (ODA), may be authorized to act on behalf of the authority. If the qualified interior expert is a SME in Europe, the qualified interior expert would be recognized as a Certification Verification Engineer (CVE) working for an organization holding EASA Design Organization Approval (DOA).

2.2.6 These SMEs should have the prerequisite training to understand the applicable regulatory certification basis of the original aircraft and the differences introduced by the proposed new design. They should also have the ability to communicate with the responsible regulatory authority and establish a compliance proposal acceptable by that regulatory authority. In some cases, lists of these qualified SME candidates may be obtained from the local regulatory authority.

2.2.7 Annex 6, Part I — *International Commercial Air Transport — Aeroplanes* contains SARPs for operationally-required equipment to be installed in commercial aircraft for the issuance of the Certificate of Airworthiness (CofA) for flight operations. Such operationally-required equipment is listed in Annex 6, Part I, Chapters 6, 7 and 13. Some States may have requirements for additional operationally-required equipment, such as cabin ozone concentration equipment, or other requirements which exceed that of Annex 6. In cases where an aeroplane has a CofA issued by one State but is operating under an Air Operator Certificate issued by another State, as frequently occurs in the case of aircraft leasing, the responsibility for approving maintenance, modifications and repairs between the two States must be clearly defined.

2.2.8 After the issuance, validation or acceptance of the TC by the State of Registry, modifications and repairs can be made to an aircraft for a variety of reasons, whether because of rule changes, mandatory actions, product improvements or incorporation of customer desires, such as cabin refurbishment or sustained damage.

2.2.9 Each State of Registry is solely responsible for the approval of the maintenance, modifications and repairs for the aircraft on its registry.

2.2.10 Minor modifications and repairs are usually accomplished in accordance with standard or generally accepted practices. However, some States of Registry may also require an approval for minor modifications and repairs.

2.2.11 The general process of approving the design change remains fundamentally the same as that of a type certification process (see Doc 9760, Part V, Chapter 2, Type Certification). In accordance with Annex 8, Part II, Chapter 1, Section 1.3, Contracting States shall ensure their approval for the design of a modification is based on satisfactory evidence that the aircraft continues to comply with the design aspects of the appropriate airworthiness requirements used for the type certification of that aircraft. Satisfactory evidence of approval of a modification is usually recorded as either an amendment or supplement to the TC or other CAA airworthiness compliance and conformity approval.

2.2.12 It must be recognized that in some cases it may not be feasible for a State, due to limited aviation activities or lack of technical and economic resources, to establish and maintain a full airworthiness engineering division (AED) in order to meet international obligations regarding aircraft modifications. This problem may be particularly acute for some States in respect of their obligation to assess and approve or disapprove the inspection, maintenance and/or modification of a large and complex aircraft. A State finding itself in this position should not in any way diminish the stringency of its regulations. However, it is essential that the State either enter into an agreement with another State for assistance with the detailed tasks, or obtain the services, on a temporary basis, of qualified inspectors from a State fully experienced in the relevant area. It is also recognized that a group of States may elect to delegate their responsibilities to a multinational organization such as a regional safety oversight organization (RSOO) or agency. It is essential that the related agreements clearly define the respective functions of each national authority and the multinational organization, RSOO or agency to ensure that all obligations of the States are fully discharged.

2.2.13 As discussed, many States do not have the capabilities to approve a major modification or repair and may rely on the State of Design (or designees from the State of Design) to recommend approval of engineering data in support of the major modification or repair. The State of Registry then accepts the recommendation.

2.2.14 All States, regardless of their technical capability to approve major modifications or repairs, are encouraged to give recognition to the modification and repairs approvals granted by the State of Design or another State with a demonstrated technical capability to avoid duplicate or redundant testing where practical and without prejudice to their unique national requirements. Many airworthiness Standards currently used by States with aviation manufacturing industries are already harmonized. The existing differences are either with the unique technical requirements, due to operational or environmental constraints, and/or interpretation of the same requirements. Although full harmonization of all airworthiness requirements is yet to be achieved, the overall objective is that all States should work towards reducing the amount of work needed to accomplish the approval of an aircraft modification and/or repair.

2.2.15 The State granting approval to a modification design is designated as the State of Design of Modification and by definition should have jurisdiction over the individual or organization responsible for the design of the modification. A clearly defined system of approval or acceptance is necessary to allow for the implementation of the responsibilities on the continuing airworthiness of aircraft in accordance with Annex 8, Part II, Chapter 4.

2.2.16 Where the State of Design of Modification is different from the State responsible for manufacturing of the modified or repaired parts, the State of Design of Modification must ensure that there is an agreement acceptable to both States to ensure that the manufacturing organization cooperates with the organization responsible for the design of the modification or repair in assessing information received on the experience with operating the aircraft.

2.3 CONSIDERATION FOR REGULATORY APPROVAL OF CHANGES TO AIRCRAFT CABIN INTERIOR

2.3.1 In regard to the approval of aircraft cabin interior changes, it is imperative the representatives of the operator and the State of Registry establish a working relationship as early as possible during the initial project planning and maintain periodic communications during the modification activity. Such communications help to clarify requirements and resolve issues that may arise from new practices, methods or technology. Additional information is also available to the representatives of the operator in the International Air Transport Association (IATA) Best Practices Guide — Cabin interior retrofits and entry into service program.

2.3.2 The operator and the State of Registry will need to consider several associated areas such as:

- a) airworthiness requirements that may include items such as crashworthiness standards (egress, floor proximity lighting, emergency lights, etc.), occupant safety, cabin safety (flammability requirements, etc.), and emergency equipment;
- b) security requirements that may include items such as identification and location of least-risk bomb location, in-flight procedures for suspicious package in cabin, cockpit doors, software security requirements and oxygen generators in lavatories; and
- c) operational requirements that may include items such as revising the operations, flight crew, or cabin crew manuals, passenger briefing, simulator data and crew training.

2.3.3 Once a cabin change project has been defined, a qualified individual or organization needs to determine if the project is a modification requiring State of Registry approval. The qualified individual or organization should then embody the work in a formal Certification Compliance Plan (CCP).

2.3.4 The applicant's CCP should identify and describe the proposed modification(s) to the aircraft cabin. The application for approval could involve a single modification or a collection of modifications. Changes to an aeronautical product may include physical design changes, changes to an operating envelope and/or performance changes.

2.3.5 The CCP may also contain individual products in the cabin (seats, galleys, new technology, etc., as applicable) and the overall conditions of the certification. All previous modifications to the affected aeronautical product that are relevant to the proposed modification need to be considered. It is important that the effects of the proposed modification on other systems, components, equipment or appliances of the affected aeronautical product are properly identified.

2.3.6 The CCP also needs to contain clear milestones for the certification process. As a part of the routinely scheduled project meetings, progress on certification milestones need to be discussed. The periodic meetings provide an excellent opportunity to provide additional information/clarification to the applicant. It is critical for the authority to plan adequate human resources and time, or make other arrangements, for performing the review and responding to the applicant's submissions.

2.3.7 Certification activities regarding cabin changes should be processed in compliance with existing State of Registry regulations and published guidance and should be readily available to the applicant.

2.4 WHEN DOES A CHANGE TO THE CABIN BECOME A MAJOR MODIFICATION

2.4.1 In respect of an aeronautical product for which a TC has been issued, a major modification would be a change in the TD that has an appreciable effect, or other than a negligible effect, on the mass and balance limits, structural strength, engine operation, flight characteristics, reliability, operational characteristics, or other characteristics or qualities affecting the airworthiness or environmental characteristics of an aeronautical product.

2.4.2 A major modification to an aircraft cabin should be accomplished in accordance with design data approved or accepted by the State of Registry or an authorized person or organization as per paragraph 2.2.5 and 2.2.6. The modification accomplished should also conform to all other applicable standards of airworthiness.

2.4.3 A major modification should not be considered as equivalent to or treated like a minor change.

2.4.4 The effects of major modifications are not usually confined to a single area, system or component of an aircraft, engine or propeller. Such modifications are generally complex changes involving several aspects with dependencies that need to be well understood. Examples of major modifications to airframe which may or may not be related to cabin interior changes include: items such as general avionics upgrade, relocation of galley, installation of non-essential auxiliary power unit, substitution of one structural bonding method for another, installation of wheel/skis, installation of quieter exhaust system, increase in fuel tank capacity, installation of new type of passenger seats, or an appreciable effect on mass. Each change should always be fully evaluated to include the product type and operational requirements to understand the effect of the change in order to accurately determine the level of modification.

2.4.5 Airworthiness activities involving the cabin interiors of large commercial aircraft have groupings that typically include:

- a) *Refurbishment* to address wear and tear from normal use. Typically, this could include carpet replacements, lavatory liner replacements, reupholstery of seats, replacement or repainting of side panels, replacement of seats, etc. This category is mostly cosmetic in nature and is generally considered as only maintenance;
- b) *Reconfiguration* to change the cabin arrangement to cater for market demands or purpose. Typically for airlines, this may include adjusting the seating allocations for first class, business class, premium economy and economy seats. Doing so may also mean adding more lavatory or galley modules, or removing some, depending on the layout. In some cases, the cabin configuration may be repurposed for specific reasons. As an example, EASA's Installation of Cargo Seat Bags on Passenger Seats (CM-CS-003) describes how the passenger cabin of specific aircraft can be readily reconfigured for the carriage of defined types of cargo. Depending on the extent of the proposed cabin reconfiguration, there may be a need to consider this activity a major modification because of changes to weight and balance, evacuation procedures, system interfaces, re-evaluation of occupant safety requirements, etc.; and
- c) *Initial installation or replacement* involves the installation of a completely new interior layout or arrangement different in intent or purpose from the existing cabin. Examples could include the addition of new interior to a green aeroplane, replacement of existing passenger cabin configuration, conversion from a VIP or executive layout to airline configuration, or conversion of cabin from all passenger carriage to Combi or all-cargo configuration due to market demands or purpose. Given the level of the cabin installation or replacement completed, this activity would normally be considered a major modification.

2.4.6 The airworthiness personnel from the State of Registry should work closely with the operator to evaluate the technical merit of each modification proposed to the cabin during the project planning stage.

2.4.7 Such communications should establish a clear understanding of the intended and/or consequential effect on the subject aircraft cabin, as each State can have its unique terms and conditions for airworthiness approvals of cabin changes. Such conditions may be more restrictive than prescribed ICAO requirements and a thorough understanding of those requirements by regulator and applicant is critical to the project's success. As an example, guidance such as FAA document *Advisory Circular No: 120-85* regarding air cargo operations, in part, provides unique terms and conditions relating to the approval and operation of Combi and all-cargo aircraft.

2.4.8 Upon granting approval for cabin change, the regulator should periodically monitor the approval holders' compliance with the terms of the approval.

Chapter 3

APPROVAL PROCESS

3.1 THE ESTABLISHMENT OF A BASIS FOR MODIFICATION APPROVAL

3.1.1 This section provides an overview of the terms and conditions relating to the approval process for aircraft cabin modifications. Such information is not intended to replace the need for each State to establish its own formal system for such approvals.

3.1.2 The approval of a modification can be processed in many ways depending on the scope and complexity of the proposed design change and the regulatory system established by national legislation for each State. The general process of approving the design change remains fundamentally the same as that of a type certification process (see Doc 9760, Part V, Chapter 2, Type Certification). The details in paragraph 2.4.5 describe changes to the cabin which are considered to be refurbishment, reconfiguration and initial installation or replacement. A more specific description of the approval process for operators and regulators regarding aircraft cabin modification is provided later in section 3.6.

3.1.3 According to Annex 8, Part II, States shall ensure their approval for the design of a modification is based on satisfactory evidence that the aircraft, engine or propeller is in compliance with the airworthiness requirements used for the issuance of the TC, its amendments or later requirements as determined by the State of Registry. To accomplish this task, some States have established an AED or equivalent organization responsible for design approvals, type certification, manufacturing approvals, evaluations of modifications and repairs proposed by manufacturers, aircraft owners, air operators and approved maintenance organizations (AMOs). Satisfactory evidence of approval of a modification is most commonly recorded as either an amendment or supplement to the TC or other CAA airworthiness compliance and conformity approval. As previously mentioned, when the State of the Operator is not the same as the State of Registry, it is necessary to consider any additional requirements of the State of the Operator. Bilateral airworthiness agreements (BAAs) or bilateral aviation safety agreements (BASAs) including implementation procedures for airworthiness (IPA) have been established among States with responsibilities for airworthiness which are beneficial for the Operators. These pre-existing agreements establish that the Passenger Interior TD work demonstrated and approved by the State of Registry is recognized by the State of Design. Through bilateral agreements or other means, each State may take full advantage of the expertise and demonstrated competency of the bilateral partner, provided that it is satisfied with the bilateral partner's airworthiness certification process and findings. Alternatively, they can obtain the technical resources from other States to make their approval determination.

3.1.4 If it is intended that a cabin modification would incorporate several design changes in a sequential manner, it should be identified when the initial application for the project is made. The cumulative effects arising from the initial design change and from all of the follow-on design changes should be included as part of the description of the change in the initial proposal. The classification of the intended cabin change should not be evaluated solely based on the initial application, but rather on the basis of all the required design changes needed to accomplish the intended cabin change. If the State of Registry determines that the current application is a part of a sequence of related changes, then the State of Registry will determine the significance and the resulting certification basis as a group of related changes.

3.1.5 As summarized in paragraph 2.2.13, many States do not have the capabilities in place to approve major modifications. This can have an adverse impact on the sales, leasing and utilization of aircraft on their registry. Some States may have established formal arrangements to rely on the State of Design (or designees from the State of Design) to recommend approval of engineering data in support of major modifications. The State of Registry then may accept the recommendation of the State of Design under its established procedures.

3.1.6 Several States have dedicated appropriate resources to its industry to meet obligations regarding the approval of modifications. Without preference, the two most active organizations in the type certification and modification process identified in this manual are EASA (*Doc. PR.CERT.00001-002* refers) and the United States FAA (*Advisory Circular No: 21-40A & 21.101-1B* refers). The two organizations have a robust bilateral airworthiness relationship mainly because of their compliance with ICAO requirements and similarity between their certification systems. The guidance published by either organization provides a useful resource for the approval of cabin modifications. Normally, the State regulator could render a positive design approval sooner if the design planning document is comprehensive.

3.1.7 The documents noted above provide examples with detailed explanations and flow charts regarding the approval process for several different situations. Some States may find the information helpful in establishing their system of certification.

3.2 APPROVAL OF MINOR CABIN MODIFICATIONS AFFECTING THE ORIGINAL TYPE CERTIFICATION

3.2.1 The approval of minor aircraft cabin modifications affecting the *original type certification* requires the applicant and regulator to thoroughly consider the original certification basis of the aircraft that is relevant to the proposed modification(s). The proposed design change should have no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics or other characteristics affecting the airworthiness of the aircraft.

Note.— The difference in what is required is in the process for showing compliance and obtaining approval. The requirement to comply is not different. The actual processes differ not only by State, but by design approval holder, depending on what sort of capability they have demonstrated.

3.2.2 The accomplishment of minor modifications usually involves the use of standards or generally accepted practices. It is important that the effects of the proposed modification on other systems, components, equipment or appliances of the affected passenger cabin are properly identified by both the applicant and the State authority. Many States of Design require that the evidence of minor findings is properly archived and auditable.

3.3 APPROVAL OF MAJOR CABIN MODIFICATIONS AFFECTING THE ORIGINAL TYPE CERTIFICATION

3.3.1 The approval of major aircraft cabin modifications affecting the original type certification requires the applicant and the State of Registry to thoroughly consider the original certification basis of the aircraft that is relevant to the proposed modification(s).

3.3.2 The State of Registry should evaluate the technical merit of each modification proposal and establish a clear understanding of the intended and consequential effect on the cabin installation. It is important that the effects and system functional impacts of the proposed modification on other systems, components, equipment or appliances of the affected passenger cabin are properly identified. The State of Registry should ensure that the installer understand its roles and responsibility for the modification. Additional information for consideration is provided in paragraph 2.3.2.

3.3.3 A major modification should be accomplished in accordance with design data approved by the State of Registry or an authorized person or organization. The modification accomplished should also conform to all other applicable standards of airworthiness. Major changes require development and approval of a certification plan which defines compliance requirements. The applicant may use the latest approved data in lieu of developing new data to show compliance; however, it must be established that the data is both valid and applicable to the modification and its use is approved by the State of Registry. The applicant's regulatory representatives must still evaluate and approve the data

under their authority. The compliance requirements may consist of analysis, inspection, testing and may include analysis reports, inspection records, and test plans and reports. Normally, there is a plan for addressing instructions for continued airworthiness (ICAs) for the new TD configuration as well.

3.4 APPROVAL OF MINOR CABIN MODIFICATIONS OF PREVIOUSLY APPROVED MAJOR CABIN MODIFICATIONS

3.4.1 The approval of minor aircraft cabin modifications affecting a previously modified type certification places added responsibility on the applicant and regulator to thoroughly consider the original certification basis of the aircraft and all subsequent modifications to the TD that are relevant to the proposed cabin modification(s). Similar to the situation in 3.2.1, the proposed design change should have no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics or other characteristics affecting the airworthiness of the aircraft.

3.4.2 As in paragraph 3.2.2, the accomplishment of minor modifications normally involves use of standards or generally accepted practices. It is important that the effects of the proposed modification on other systems, components, equipment or appliances of the affected passenger cabin are properly identified. Many States of Design require that the evidence of minor findings is properly archived and auditable.

3.5 APPROVAL OF MAJOR CABIN MODIFICATIONS OF PREVIOUSLY APPROVED MAJOR CABIN MODIFICATIONS

3.5.1 The approval of major aircraft cabin modifications affecting a previously modified type certification places significant added responsibility on the applicant and regulator to thoroughly consider the original certification basis of the aircraft and all subsequent modifications to the TD that are relevant to the proposed cabin modification(s). Again, a change in the TD that has an appreciable effect or other than a negligible effect on the mass and balance limits, structural strength, operational characteristics, or other characteristics or qualities affecting the airworthiness is commonly accepted as a major modification.

3.5.2 Given consideration of previous modification history, the State of Registry should evaluate the technical merit of each modification proposed and establish a clear understanding of the intended and consequential effect on the cabin modification. It is important that the effects of the proposed modification on other systems, components, equipment or appliances of the affected passenger cabin are properly identified as described in paragraph 2.3.2.

3.5.3 Again, a major modification would be accomplished in accordance with design data approved by the State of Registry or an authorized person or organization. The modification accomplished should also conform to all other applicable standards of airworthiness.

3.6 THE PROCESS

3.6.1 Application for approval of an aircraft cabin modification

3.6.1.1 Any person or organization may apply for approval of a proposed modification to an aircraft passenger cabin. This could include the aircraft owner or air operator, a TC holder, a maintenance organization, a specialized engineering organization, an engineering consultant, or, where allowed by a State, their representatives. The applicant must be the organization or individual with responsibility for the proposed modification and in whose name the approval will be granted. In cases of complex design changes involving multinational agreements, joint ventures, partnerships or similar collaborations, the applicant remains responsible for integrating all design data from its various sources and submitting it to the airworthiness organization of the State as a complete and detailed proposal for the modification of an aircraft cabin.

3.6.1.2 A State that has first taken responsibility for approval of a cabin modification is designated as the State of Design of Modification and, by definition, must have jurisdiction over the individual or organization responsible for the design of the modification. A clearly identified State of Design of Modification is necessary to allow for the implementation of the responsibilities on the certification and continuing airworthiness of the aircraft as described in Annex 8, Part II. The regulator must be able to direct a single point of contact to investigate a safety consideration.

3.6.1.3 The State of Registry, in approving cabin modifications, should ensure that the applicant has:

- a) comprehensive knowledge, experience and capabilities in the applicable technologies for aircraft cabin modifications, such that in-depth analyses can be performed where required; and
- b) sufficient information on the TD of the aircraft involved.

3.6.1.4 The State of Registry should establish within its regulations the requirements for application for the approval of modifications. An application for the approval of a cabin modification should be submitted in a form and manner prescribed, or agreed to, by the CAA. Information contained on the application for the proposed cabin modification should include, at a minimum, the following:

- a) name and address of the applicant to which the approval will be issued;
- b) make and model of the affected aircraft (registration and serial number) and its TC number (or approval reference);
- c) title, detailed description and purpose of the proposed modification to the aircraft passenger cabin;
- d) type of approval requested;
- e) the proposed airworthiness Standards to which the proposed modification is designed and with which it is intended to comply; and
- f) documentation including substantiating data of the design change:
 - 1) for an applicant subject to the national legislation and regulations of the State of Registry, an indication on the need for a concurrent or subsequent approval by another State; and
 - 2) for an applicant not subject to the national legislation and regulations of the State of Registry, evidence of prior approval by the State of Design of Modification that has jurisdiction over the individual or organization responsible for the modification.

3.6.1.5 The applicant should identify and describe the proposed modification to the cabin. The application for approval could involve a single modification or a collection of modifications. As provided in paragraph 2.3.2, appropriate consideration should be given to all associated modifications.

3.6.2 Approval activities

The main objective of the approval process is for a State of Registry to determine the overall compliance of a proposed modification with its appropriate airworthiness requirements so that the aircraft, when modified, will continue to have a valid and approved TD. The State of Registry has the responsibility to establish satisfactory evidence of approval of a modification of an aircraft that has been issued a TC or a CofA as per Annex 8. There are five key activities associated with a modification, namely:

- a) establishing a certification basis;

- b) establishing the means or methods of compliance;
- c) demonstrating compliance and findings;
- d) approving the modification; and
- e) undertaking post-approval activities including ICA.

3.6.3 Establishing a certification basis

3.6.3.1 The TCDS of an aircraft identifies the detailed certification basis by which the TD of the aircraft was originally approved. The major components of a certification basis are the airworthiness standards, including, if any, special conditions of airworthiness, findings of equivalent level of safety, and exemptions. For most States, the approval procedure depends on ensuring that a modified aircraft continues to comply with the certification basis recorded in the TCDS. However, ICAO encourages States to undertake activities for enhancing safety in civil aviation and, among other things, promoting an airworthiness policy of approving modifications to a level of safety higher than that intended by its original certification basis. Each modification should be analysed for approval to a higher level of safety promoted by the newer policies and regulations. This policy requires that modifications demonstrate compliance with design standards that are in effect on the date of application. As discussed in 2.2.4, the State of Design may need to upgrade the certification basis, depending on the nature of the modification.

3.6.3.2 In the application for a cabin modification approval, the applicant should include the airworthiness and applicable Standards to which it intends to demonstrate compliance. Depending on the nature of the modification, additional airworthiness or operational requirements may be imposed by a State, or an applicant may be required to show that the cabin modification(s) meet(s) additional standards to receive approval in another State, due to differences in requirements. All these requirements are established collectively to become the certification basis for the modification. The applicant should participate in any CAA discussion concerning the proposed certification basis, but it remains the ultimate responsibility of the CAA to evaluate and ensure that the certification basis is appropriate for the proposed modification.

3.6.4 Environmental Standards

The applicable environmental Standards for an aircraft are described in Annex 16 — *Environmental Protection*. States that have not adopted or accepted Annex 16 as their environmental Standards may use other standards provided they are at least equal to the Standards of Annex 16. Consideration should be given to any environmental impact during the modification of the aircraft cabin.

3.6.5 Establishing the means of compliance

3.6.5.1 It is the responsibility of the applicant to demonstrate compliance of the proposed cabin modification with the certification basis of the aircraft in accordance with the means or methods accepted or agreed to by the CAA. In order to manage this aspect during the modification approval process, it is necessary to agree on a CCP that clearly identifies the type of actions to be applied against each affected item of the certification basis. The majority of States find it necessary to have a compliance plan. The CCP can be an effective tool in managing the certification programme by providing an early understanding of what is required to achieve approval and assisting in the identification of approval problems early in the programme.

3.6.5.2 **Means of compliance**

3.6.5.2.1 The means of compliance are usually dictated by the specific item of the certification basis, and generally fall into one or any combination of the following actions:

- a) *Test* — is performed when the requirement explicitly calls for a demonstration by test (physical, actual or simulation);
- b) *Analysis* — is performed when the requirement explicitly calls for a demonstration by analysis (qualitative, quantitative or comparative), or when the applicant can demonstrate, based on previously accepted test results, the validity of using analysis in lieu of testing, and;
- c) *Inspection or evaluation* — is performed against an item that does not require test or analysis, but relies on observation, judgment, verification, evaluation or a statement of attestation from the applicant or its vendors and contractors.

3.6.5.3 **Certification compliance plan**

3.6.5.3.1 The CCP is the primary document in the modification approval process that serves both as a checklist and an official record of compliance. The applicant should prepare a CCP and establish its contents in agreement with the CAA. The CCP should, at a minimum, contain the following information:

- a) itemized breakdown of the certification basis;
- b) proposed means of compliance for each item (test, analysis, inspection or combination of these, or finding of equivalent level of safety);
- c) lists of tests to be conducted;
- d) identification of substantiating reports to be submitted (as proof of compliance);
- e) identification of persons responsible for the findings of compliance;
- f) the level of involvement of the CAA, the applicant, or a delegate of the CAA in the findings of compliance or witnessing of tests; and
- g) modification project schedule, including the established milestones and when final approval is expected.

3.6.5.3.2 The activities involving demonstration of compliance should not begin until after a CCP has been agreed to by the applicant and the CAA. The original (or master) copy of the CCP is retained by the CAA until completion of the modification approval activity. Upon completion of the programme, the plan can be the official certification compliance record for the modified passenger cabin.

3.6.5.4 **Level of involvement**

3.6.5.4.1 Some States have regulations supported by national legislation that allow the delegation of some or all of their functions, duties or powers to qualified individuals or organizations. The responsibilities assigned by the regulations to a State, however, cannot be delegated and always remain with the State. Under a delegation system, appropriately qualified individuals or organizations may be granted the authority to make a finding of compliance on behalf of their State. A finding of compliance by a delegated party is a finding of compliance by the State. As such, an administrative procedure should exist for the recording of the finding of compliance by the delegated individual or organization. Some findings of

compliance, however, may be the exclusive responsibility of the CAA and cannot be delegated, or the CAA may limit the delegated party to making recommendations only instead of making a finding of compliance. If the applicant proposes to utilize delegated individuals or organizations in the modification approval programme, the exact role of the delegated parties should be clearly identified in the CCP and agreed to by the CAA. The levels of involvement of the CAA, applicant and delegated parties would be defined by the State's delegation system, taking into account such factors as limitations of the delegated parties, complexity of the modification, availability of technical resources and time constraints of the modification approval project.

3.6.6 Demonstration and finding of compliance

3.6.6.1 General

According to Annex 8, Part II, Chapter 1, proof of compliance with the design aspects of the appropriate airworthiness requirements shall be established through the approval of the modification and the performance of necessary inspections and appropriate ground or flight tests. In the CCP, the means of demonstrating compliance (test, analysis, inspection or evaluation) and the levels of involvement (applicant and CAA) are already specified for each item of the certification basis. The applicant is responsible for demonstrating compliance through the agreed means, while the CAA is responsible for making a finding of compliance on the means demonstrated. Both demonstration and finding of compliance should be recorded against each item in the plan as evidence of a successful completion. The implementation of the plan is the joint responsibility of the applicant and the CAA, and the modification approval schedule contained in the certification plan is to be tracked.

3.6.6.2 Demonstration of compliance

3.6.6.2.1 The demonstration of compliance requires that the applicant submit substantiating data (design data, reports, analyses, drawings, processes, material specifications, operations limitations, aircraft flight manuals (AFMs) and ICA). The data should be complete and in a logical format for review by the CAA. Where the demonstration of compliance involves a test, a test plan should be developed and approved prior to any actual test performed. Official certification tests may be witnessed by CAA personnel or by a CAA delegated party, when authorized.

3.6.6.2.2 The applicant should give the CAA access to the passenger cabin being modified to conduct any inspections, tests, and engineering assessment or to conduct any flight or ground tests that are necessary to determine compliance with the certification item. However, the applicant should perform its own inspection and tests necessary to demonstrate compliance prior to presenting the modified passenger cabin to the CAA for testing or evaluation.

3.6.7 Conformity inspection

Where required, conformity inspection should be performed by the CAA to verify conformity of the modified passenger cabin with drawings, specifications and special processes. An engineering inspection should not be confused with a conformity inspection. A conformity inspection is done to determine conformity with the engineering data, while an engineering inspection is done to determine compliance with the certification requirement.

3.6.8 Finding of compliance

Findings of compliance are made against airworthiness and environmental Standards. The finding of compliance can be made by the CAA, or by its authorized delegate, depending on the predefined levels of involvement in the CCP. Following

a successful demonstration of compliance by the applicant on a certification item, the CAA should make a finding of compliance and subsequently sign off on the item in the CCP. The findings are usually accomplished by the CAA based on one or any combination of the following actions:

- a) *Acceptance of substantiating data.* Reports, analysis, drawings or similar documents are usually produced against each certification item and should be reviewed and accepted;
- b) *Witnessing of Test.* Tests are performed, and witnessed by the CAA where required or agreed to, in accordance with an approved test plan. The witnessing of a test is not a finding of compliance; it is to verify that the test was done according to the test plan and to assess the results. The findings of compliance will occur during assessment and approval of the test report. The test should be conducted only after conformity with the test plan has been established for the test articles, test environment and test facilities. The CAA does not perform the non-flight testing and should remain impartial and concentrate on the test objective. The CAA or its delegate may perform the flight testing;
- c) *Engineering inspection.* Any aspect of the modification for which compliance with the certification item cannot be determined through review of drawings or reports should receive an engineering compliance inspection. An engineering compliance inspection is to assure that an installation and its relationship to other installations within a passenger cabin comply with the design requirements; and
- d) *Flight Test.* Where required, for aircraft, an actual demonstration of flight capabilities and characteristics is conducted in accordance with an approved flight test plan.

3.6.9 Approving the modification

All findings of compliance made by the CAA, or its delegate, should be recorded or annotated in the CCP. When the applicant has demonstrated compliance and the CAA has found full compliance on all applicable items of the certification basis, including the resolution of outstanding items, the plan is signed off and becomes the official compliance record for the modification project. The certification compliance record serves as the satisfactory evidence specified under Annex 8, Part II, for the approval of the modification. The approval of the modification means that:

- a) the airworthiness requirements affected by the modification meet all the relevant requirements specified in the certification basis, including special conditions of airworthiness issued by the CAA;
- b) all engineering and conformity inspections have been completed and the modified passenger cabin has been found to meet all pertinent requirements; and
- c) in the case of aircraft, the modified aircraft has been test flown, as required, and found to comply with all the performance requirements of the pertinent airworthiness Standards.

3.6.10 Issuance of approval

3.6.10.1 Most States will grant approval of a major modification to the cabin using one of the three forms of approval below, provided the proposed modification is not so extensive as to require a new TC. Depending on the applicant's eligibility, the form of approval for the proposed modification is usually indicated by the applicant at the time of application (see paragraph 3.6.1 above). Annex 8 does not specify the exact form for recording an approval of a modification. Some State of Registry may only accept or recognize, for their purpose, a foreign modification that was approved using an amended TC or supplemental type certificate (STC). Some examples of recording the approval of a modification include:

- a) *Amendment of a type certificate.* The holder of a TC can make an application to amend a TC. The holder retains the overall responsibility for the TD of an aircraft, engine or propeller. Common examples of

design changes leading to an amendment of a TC may be the addition of a new model designation or derivative of an aircraft, the revision of operating conditions or limitations listed in the TCDS, including changes to aircraft passenger or cabin configuration;

- b) *Supplemental type certificate.* An STC is an approval of a major modification covering those areas or aspects of an aeronautical product that were modified. It should be noted that an aeronautical product that does not have a TC cannot be issued a modification approval under an STC (e.g. appliances, parts, components, instruments). Also, an STC should not be issued for approval of minor modifications, or approval of replacement parts or repair, unless its installation represents a modification; and

Note.— On the request of the applicant, an STC may be issued for approval of a minor modification, or approval of replacement parts or repair.

- c) *Other approvals.* For modifications that do not warrant the detailed approval process of an amended TC or STCs, States may consider other means of granting approval. Such means of approval may be administered by delegated individuals or organizations with demonstrated technical competence, and reported to the CAA under an administrative reporting system for purposes of regulatory oversight. Modifications that are candidates for this approval category typically involve on-demand design changes by air operators, maintenance organizations, design organizations, and manufacturers to support varying maintenance and operational needs under time constraints. Examples of modifications that can be approved under this category could include product improvements by manufacturers (introduced through service bulletins (SBs)), airline type modifications relating to operational reliability or passenger configuration changes, repair design, and field-type modifications that do not involve extensive or multidiscipline engineering analysis. SBs that are already approved could be implemented using an operator's existing alteration system, since the design change has already been approved, and the issue is the incorporation of the design change as defined. The types of design changes that can be approved using this other means should be decided by each State according to its resources, delegation policy, and the level of modification activity within its civil aviation industry.

3.6.10.2 The person or organization (holder) to which the modification approval was granted has responsibility for the approved design change. If multiple participants (e.g. joint design ventures, partnerships, subcontracting or similar arrangements) are involved in the modification, the CAA will require one person or organization to be responsible for the overall design change and to whom the approval will be issued.

3.6.10.3 An approval granted for a modification of the cabin (amended TC, STC or other approval) should remain valid until otherwise specified or notified by the issuing CAA.

3.6.11 Documents necessary for operation of a modified aircraft

Other information necessary for the safe operation of the aircraft under Annex 6 was developed concurrently with type certification. If the approved modification changes any of the information identified in Doc 9760, Part V, Chapter 2, Type Certification, the applicant should prepare the appropriate revision to this information and submit it for the CAA's approval or acceptance. Following approval or acceptance by the CAA, the revised information should be published in a form and manner prescribed by the CAA and subsequently provided as part of the modification approval documentation.

3.6.12 Post-approval activities

The State of Design (i.e. State that first gave the initial approval) is responsible as per Annex 8 to provide continuing airworthiness support to the State of Registry (i.e. a State that incorporated the modification on its aircraft). The CAAs of both States and the holder of the modification approval fulfil this responsibility through a system of receiving and exchanging of information, surveillance, assessment of service difficulty experiences, and development of the necessary airworthiness actions. Annex 6 provisions require detailed record-keeping of modifications and evidence of compliance with the appropriate airworthiness requirements.

3.6.13 Retention of design change data

The data constituting the design change are contained in records, reports, drawings and other documents that describe collectively the exact configuration of the design change when it was approved. The design change data must be maintained by the CAA or the holder of the modification approval, or both. The CAA should determine the eligibility and type of data to be maintained by the modification approval holder. In either case, it should be recognized that the design change records are permanent and may not be destroyed. Data maintained by the modification approval holder must be made available to the CAA for such routine activities as production inspection, surveillance, design change reviews, development of corrective actions, or for any other reasons deemed necessary by the CAA. The record-keeping should consist of at least the following:

- a) the drawings and specifications, and a listing of those drawings and specifications necessary to define the configuration and design features of the modification as was shown to comply with the requirements applicable to the passenger cabin;
- b) reports on analysis and tests undertaken to substantiate compliance with the applicable requirements;
- c) information, materials and processes used in the construction of the modification of the aircraft;
- d) an approved AFM supplement or its equivalent (type-related document), including revisions to the master minimum equipment list (MMEL) and configuration deviation list, if applicable;
- e) approved revisions or recommendations to the maintenance programme or equivalent document, and aircraft maintenance manual (AMM) with details of revisions to the manufacturer's recommended and CAA accepted scheduled maintenance plan and procedures guidelines; and
- f) any other data necessary to allow, by comparison, the determination of airworthiness and noise characteristics (where applicable) of modified passenger cabins of the same type.

3.6.14 Responsibility of holder of modification approval

The holder of the modification approval remains responsible for the continued integrity of the design change to the approved TD and it or its representative must continue to be the CAA's contact point for resolving issues that may require corrective action. To fulfil this responsibility, the holder should have the continued capability, or access to the capability, of providing appropriate technical solutions for service difficulties when service experience warrants it, or when the CAA requires mandatory corrective action. If the holder is no longer capable, the CAA must take action in accordance with Doc 9760, Part III, Chapter 9. If the approval is transferred to another holder, the CAA should ensure that the new holder is capable of fulfilling the minimum responsibilities described herein.

3.6.15 Continuing airworthiness

Annex 8, Part II, Chapter 4, prescribes the activities and corresponding responsibilities of a State of Design of Modification, the State of Registry and the modification approval holder in ensuring the continuing airworthiness of an aircraft during its entire operational or service life. Service experiences involving faults, malfunctions, defects and other occurrences that may affect the continuing airworthiness of the aircraft are required to be recorded, reported and assessed as per Annex 8, Part II. This information is used to determine if an unsafe or potentially unsafe condition exists in an aircraft. The State of Design of Modification, State of Registry and the modification approval holder all play important roles in deciding if and when airworthiness action is required to either correct an unsafe or avoid a potentially unsafe condition.

3.6.16 Cabin modification approval process

A flow chart describing the modification approval process is contained in Figure 3-1 below.

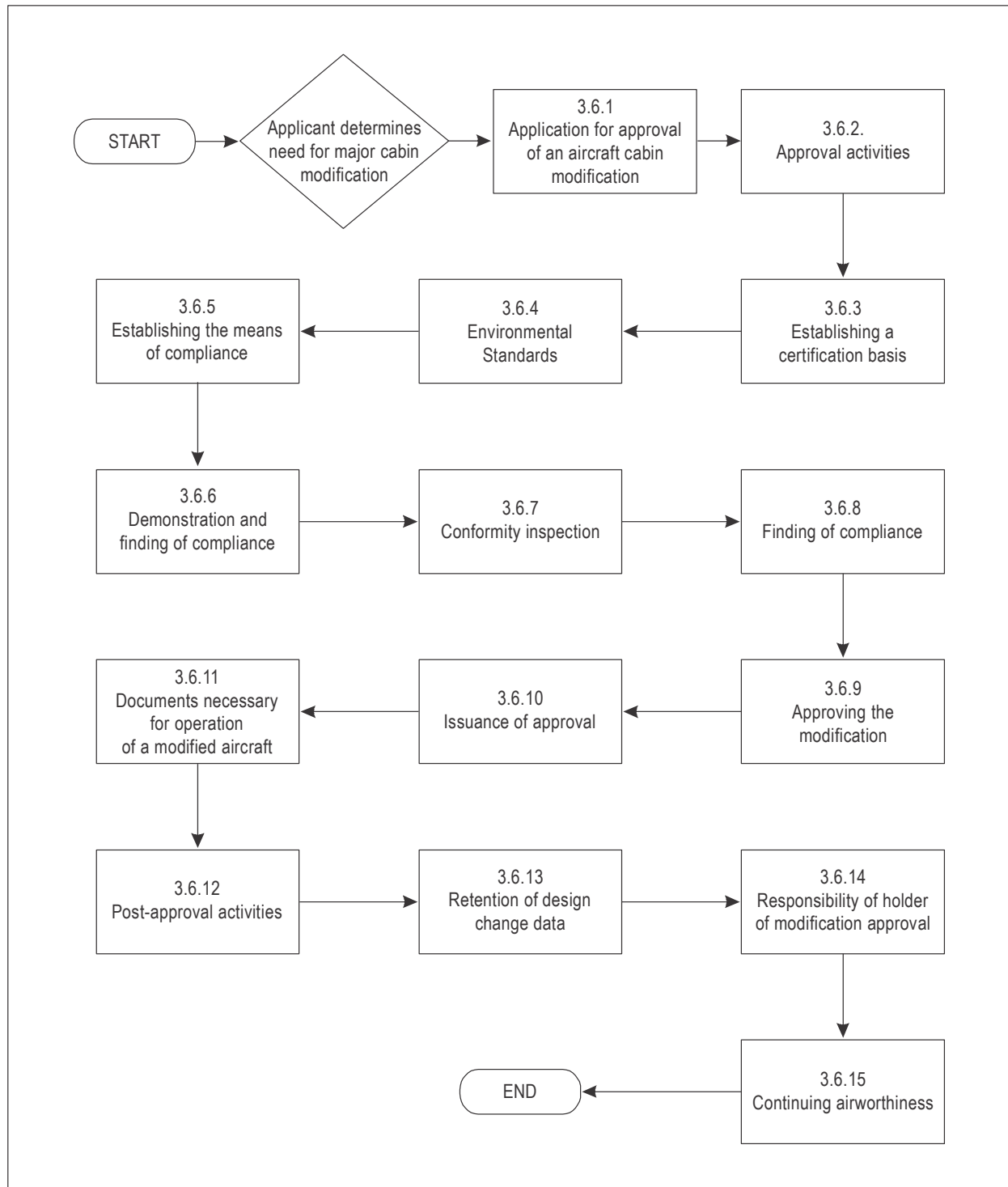


Figure 3-1. Cabin modification approval process

Chapter 4

SHOWING COMPLIANCE FOR CABIN MODIFICATIONS

4.1 As provided in Annex 8, Part II, Chapter 1, the proof of compliance with the design aspects of the appropriate airworthiness requirements is established through the approval of the modification and the performance of necessary inspections. The means of demonstrating compliance (test, analysis or inspection/evaluation of the cabin) and the levels of involvement (by applicant and CAA) are contained in the CCP, specifying each item of the certification basis. As an example, the following conditions may be found as a part of a CCP:

- a) exchange of floor covering (carpet or Non-Textile Flooring) in line with the original equipment manufacturer (OEM). Installation may require flammability testing and check of slip resistance and floor path marking;
- b) exchange of seat covers without changing the cushion may require flammability testing of the material and oil burner test of the combination (dress cover & cushion); and
- c) installation of an additional seat row or removal of a seat row may require a review of the following:
 - 1) floor loads;
 - 2) floor path marking;
 - 3) Passenger Service Unit rearrangement, visibility of signs, oxygen mask drop;
 - 4) evacuation capability of the new layout;
 - 5) review of the emergency exit access (when affected);
 - 6) review of the dynamic seat test data for compliance with applicable requirements, (e.g FAA CFR 25.562 - Emergency landing dynamic conditions or EASA CS 25.562 Emergency landing dynamic conditions). For this the certification basis needs to be checked as well as national operational or change requirements; and
 - 7) aircraft mass and balance.

The above listing is not intended to be all-inclusive, but could be useful to indicate the amount of effort necessary to accomplish a CCP.

4.2 The applicant is responsible for demonstrating compliance through the agreed means, while the CAA is responsible for the finding of compliance on the means demonstrated. Both demonstration and finding of compliance are recorded against each item in the compliance plan as evidence of a successful completion. The implementation of the plan is the joint responsibility of the applicant and the CAA.

4.3 The demonstration of compliance requires the applicant to submit substantiating data (design data, reports, analysis, drawings, processes, material specifications, operations limitations, AFM and ICA related to the cabin). The data should be complete and in a logical format for review by the CAA. Where the demonstration of compliance involves a test,

a test plan should be developed and approved by the CAA prior to any actual test performed. Official certification tests, which may include a conformity plan, must also be part of the compliance test proposal. These are witnessed by CAA personnel or by a CAA delegate, when authorized.

4.4 As part of the demonstration, the applicant should give the CAA access to the passenger cabin being modified to conduct any inspections, tests, and engineering assessment or to conduct any flight or ground test that is necessary to determine compliance with the certification item. In keeping with best practices, the applicant should perform internal inspection(s) and test(s) as necessary to demonstrate compliance prior to presenting the modified passenger cabin to the CAA for testing or evaluation.

4.5 EASA and the FAA have published several documents which are available on the Internet regarding type certification and the approval of modifications which describe methods for the showing of compliance. *Airworthiness of Type Design, EASA Doc. PR.CERT.00001-002 and FAA Advisory Circular 21-40*, as revised, *Guide for Obtaining a Supplemental Type Certificate* provide information that would be a beneficial initial resource for those States working to establish a formal system for the approval of modifications.

Chapter 5

JOB AIDS/APPROVAL FORMS USED FOR CABIN MODIFICATIONS

5.1 SAMPLE INSPECTOR JOB AIDS

5.1.1 The inspector job aid is a tool to assist qualified CAA personnel to perform a task in a consistent and unbiased manner. The content of the job aid is unique to each CAA organization as it describes a process of “how to” that is consistent with its national law, regulations and policy. The job aid is organized in a manner that assists the CAA in performing a systematic evaluation of specific elements of an activity or process requiring training, equipment, materials, technical data, qualified personnel, etc.

5.1.2 Job aids typically include a section or forms to record pertinent information about the activity, followed by questions to evaluate each of the elements. Not all the questions in the elements may be applicable. Each element typically has an area for remarks associated with a specific question.

5.1.3 Some CAAs have adapted or adopted job aids of other countries. The burden to produce appropriate guidance/job aids can be reduced for those CAAs who have elected to formally adopt another State’s system for certification in total. To either adapt or adopt requires a purposeful review of the material to determine what changes or arrangements are needed for the content to be in compliance with the CAA’s own national law, regulations and policy.

5.1.4 There are several States that have published their own job aids for the approval of aircraft modifications. There is no single style or format for job aids. In support of those who wish to establish a system for the approval of modifications, the following documents are a small sample of what is available. There are commercial providers with experience who are able to assist in the development of a certification process and composition of related materials.

5.1.5 Examples of job aids for certification activities include, without preference:

- EASA Airworthiness of Type Design Doc PR.CERT.00001-002;
- FAA Type Certification Order 8110.4, as revised; and
- JCAB Procedures for Type Certification of Japanese Manufactured Aircraft, Circular No. 1-003.

5.2 SAMPLE FORMS

5.2.1 The CAAs from several States and EASA have developed forms in support of aircraft certification activities that are specific to their particular systems. The type and number of forms are proportional to the size and complexity of the State’s aviation industry’s involvement in the production and modification of aircraft. As an example, there are sixteen forms listed in FAA Order 8110.4, as revised, supporting type-certification activities in the U.S. In smaller CAAs with limited manufacturing and aviation activity, the certification process may include fewer forms.

5.2.2 The forms required (and how to use them) are a product of the development of each CAA’s established guidance/job aids. As in the case of related job aids, there is no single style or format for forms. The development and use

of the forms must be in compliance with national requirements and published guidance. The burden to produce appropriate forms can be reduced in a similar manner for those CAAs who have elected to formally adopt another State's system for certification in total.

5.2.3 The two documents frequently discussed in the process for approval of cabin modifications are the application for approval and the CCP. In keeping with paragraph 3.6.1.4, the application form for the approval of a cabin modification should be submitted in a form and manner prescribed by the CAA. The application should contain at a minimum the information outlined in 3.6.1.4, subparagraphs a) through f).

5.2.4 There are several examples of the application for certification approval available on the Internet. While some include initial type, supplemental type and modifications, they all provide general format and content. However, the CAA would need to develop its own document in keeping with its guidance. Two samples of such content, without preference, are provided below:

- Government of India Directorate General of Civil Aviation, Form CA-33; and
- Civil Aviation Department, Hong Kong Special Administrative Region, Application for validation of supplemental type certificate (VSTC) DCA-539.

5.2.5 As described in paragraph 3.6.5.3.1, the CCP is the primary document in the modification approval process that serves both as a checklist and an official record of compliance. The CCP submitted by the applicant should, at a minimum, contain the information described in 3.6.5.3.1, subparagraphs a) through g).

5.2.6 There are also several examples of CCPs available on the Internet. While they provide general format and content, the CAA would again need to develop its own document in keeping with its guidance. Two samples of such content, without preference, are provided below:

- EASA Template for Certification Programme ETSO; and
 - New Zealand Advisory Circular AC21-8 Appendix A.
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Chapter 6

RESPONSIBILITIES FOR THE DEVELOPMENT OF INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

6.1 Annex 8, Part II, Chapter 4, prescribes the activities and corresponding responsibilities of a State of Design of Modification, the State of Registry and the modification approval holder in ensuring the continuing airworthiness of an aircraft during its entire operational or service life.

6.2 Continuing airworthiness covers the processes that require all aircraft to comply with the airworthiness requirements which are either prescribed in their respective type certification basis or imposed as part of the State of Registry's requirements, and to be in a condition for safe operation at any time during their operating life.

6.3 Under the control of the respective CAAs of the State of Design of Modification, the State of Registry and, when appropriate, the State of Operator, continuing airworthiness includes the following:

- a) definition of design criteria which provide the necessary accessibility for inspection and permit the use of established processes and practices for the accomplishment of maintenance;
- b) information that identifies the specifications, methods and procedures necessary to perform the continuing airworthiness tasks identified for the aircraft type and the tasks necessary to maintain the aircraft, as developed, by the TD organization or State of Design of Modification as appropriate; and publication of this information in a format that can be readily adapted for use by an air operator;
- c) adoption by the air operator into its maintenance programme of the specifications, methods and procedures necessary to perform the continuing airworthiness tasks identified for the aircraft type and the tasks necessary to maintain the aircraft, using the information provided by the TD organization or State of Design of Modification as appropriate;
- d) reporting of faults, malfunctions, defects and other significant maintenance and operational information by the air operator to the TD organization or State of Design of Modification as appropriate, in compliance with the requirements of the State of Registry and the State of Operator;
- e) reporting of faults, malfunctions, defects and other significant maintenance information by the maintenance organization to the TD organization or State of Design of Modification as appropriate, in accordance with the requirements of the State having jurisdiction over the maintenance organization;
- f) analysis of faults, malfunctions, defects, accidents and other significant maintenance and operational information by the TD organization or State of Design of Modification as appropriate, the State of Design and the State of Registry and the initiation and transmission of information and recommended or mandatory action to be taken in response to that analysis;
- g) consideration of the information provided by the TD organization or State of Design of Modification as appropriate and action on the information as deemed appropriate by the air operator or the State of Registry, with particular emphasis on action designated as "mandatory";

- h) adoption and accomplishment by the air operator of all mandatory requirements with particular emphasis on fatigue life limits and any special tests or inspections required by the airworthiness requirements of the TD of the aircraft or subsequently found necessary to ensure structural integrity;
- i) adoption by the air operator into its maintenance programme of supplemental structural integrity programmes (SIPs) and subsequent SIP requirements, taking into consideration the SIP for aeroplanes recommended by the TD organization or State of Design of Modification as appropriate; and
- j) compliance with SIPs for aeroplanes.

6.4 In this situation, the development of ICAs is a requirement for the products and systems that have been developed and installed in the modified aircraft cabin. The ICA need only address continued airworthiness of the design change for which application was made, as well as parts or areas affected by the design change. The modified aircraft cannot be operated without an accepted ICA from the CAA, even though an approval for modification may have been issued. Past experience has shown the development of the ICA should be worked on concurrently and not left until the end of the certification project. ICA requirements for the cabin could include the need to develop content for items such as component maintenance manuals (CMM), Illustrated parts catalogues (IPC), AMM supplements, structural repair manual (SRM), wire diagram manual (WDM) supplements, minimum equipment list (MEL) revisions/supplements, etc. It is the applicant's responsibility to establish with the CAA the applicability of the prior ICA in combination with additional supplemental ICA needed to address the final interior modification TD. The revised documentation described above must be made available to the operator of the modified aircraft in a manner as required under existing regulations.

6.5 Both the EASA and the FAA have published several comprehensive certification documents which include details on the development of the ICA. Among the publications, *Certification Specifications and Acceptable Means of Compliance for Large Aeroplanes, EASA CS-25, Book 2, Appendix H*, and *FAA Order 8110.54A, Instructions for Continued Airworthiness Responsibilities, Requirements, and Contents*, are excellent initial resources to assist a CAA in establishing the national requirements for ICA as a part of its certification process.

Chapter 7

RECOGNITION OF MAJOR AIRCRAFT CABIN MODIFICATIONS BY OTHER STATES

7.1 As described in Doc 9760, Part III, Chapter 8 and previously discussed in paragraph 1.5, all States, regardless of their technical capability to approve major modifications, are encouraged by ICAO to give recognition to the modification approvals granted by the State of Design or another State with a demonstrated technical capability, and avoid duplication or redundant testing where practical, without prejudice to their own unique national requirements.

7.2 For a State of Registry to recognize cabin modifications previously approved by another State, there must be a legal basis in the State of Registry's regulatory framework that enables the CAA's acceptance of foreign-approved data. The recognition or acceptance of such approvals can be enabled by either a unilateral action on the part of a State of Registry through their national legislation and regulations, or through a bilateral agreement between two States. Regardless of the enabling provision, the State of Registry's ability to accept or recognize foreign approvals must be based on the confidence in the demonstrated technical capability and competencies of the other State's airworthiness functions. This allows the State of Registry to be confident that qualified personnel conformed the test articles and setups according to approved plans, and that the tests were appropriately witnessed.

7.3 If the data for the modification resulted from the programme of a CAA bilateral partner, there is a need for the State of Registry to establish whether the CAA partner was directly involved in approving the data under its system, as described in the existing bilateral agreement. If the CAA did not participate in or delegate the activity appropriately, then the data would not have been produced under the terms of the bilateral agreement and would not be valid for consideration. In this situation, the applicant would need to perform the required tests and analysis necessary to show compliance.

7.4 Technical data obtained from a foreign source may not always have a self-standing statement of compliance from the CAA. As an example, the results of the process could be certified as "completed" or "satisfactory" as substitutes for a certification statement. Evidence of stamps, signatures or other markings on the data package may demonstrate evidence of approval or delegation, as determined by the CAA. The applicant should ensure the documentation in a data package contains the appropriate markings and approvals when presented to the CAA for approval.

7.5 Several States maintain a comprehensive system for the bilateral recognition of airworthiness approvals. Such recognition is done under a negotiated formal agreement between governments in the form of a BAA or BASA. The European Union, and countries such as Brazil, Canada, India, Indonesia, Malaysia, Mexico, Singapore, and the United States, among others, have existing agreements in force. Descriptions of a State's bilateral process and active agreements are normally available to the public on the respective authority's websites.

7.6 It is important for the applicant requesting approval to review the existing State of Registry's bilateral agreements, if available, and any associated procedures for implementation to determine if the compliance data previously approved by a bilateral partner would be recognized by the State of Registry, or if there would be a need for further validation compliance work.

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