



Australian Government

Civil Aviation Safety Authority

DRAFT

ADVISORY CIRCULAR

AC 21-8

**Approval of modification and repair
designs under Subpart 21.M**

Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory Circulars should always be read in conjunction with the relevant regulations.

Audience

This Advisory Circular (AC) applies to:

- approved design organisations
- authorised persons for Subpart 21.M
- holders of modification/repair design approvals for aircraft, aircraft engines, propellers and appliances
- approved maintenance organisations
- applicants for approval of modifications or repairs.

Purpose

The purpose of this AC is to provide information and guidance on the application, assessment and approval of designs of modifications and repairs under Subpart 21.M.

Status

Version	Date	Details
v 1.0	August 2014	Initial issue of this AC.

For further information

For further information on this AC, contact CASA's Airworthiness and Engineering Standards Branch (telephone 131 757).

Unless specified otherwise, all subregulations, regulations, Subparts, Parts and Divisions referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

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1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	Advisory Circular
ADO	Approved design organisation
AFM	Aircraft flight manual
ALI	Airworthiness limitation item
AMO	Approved maintenance organisation
APMA	Australian Parts Manufacturing Approval
ATSO	Australian Technical Standard Order
CAR	<i>Civil Aviation Regulations 1988</i>
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
CMR	Certification maintenance requirement
COTS	Commercial/off-the-shelf
DA	Design advice
EASA	European Aviation Safety Agency
FITCOM	Fabrication in the course of maintenance
ICA	Instructions for continuing airworthiness
MEL	Minimum equipment list
MITCOM	Manufacture in the course of maintenance
NAA	National Airworthiness Authority
SB	Service bulletin
STC	Supplemental type certificate
TC	Type certificate

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below.

Term	Definition
Aeronautical product	Any part or material that is, or is intended by its manufacturer to be, a part of or used in an aircraft, unless excluded by the regulations. ¹
Aircraft component	(a) any part or equipment for an aircraft that, when fitted to, or provided in an aircraft may, if it is not sound or functioning correctly, affect the safety of the aircraft, its occupants or its cargo or cause the aircraft to become a danger to person or property (b) flotation equipment, evacuation equipment, ration packs, portable breathing apparatus, fire-fighting equipment, or any other equipment or apparatus, fitted to, or provided in, an aircraft for use in an emergency. ²
Airworthiness requirements	The comprehensive and detailed requirements established, adopted or accepted under the regulations for the airworthiness of the aircraft or aeronautical product. The airworthiness requirements include the applicable airworthiness standards and other requirements such as airworthiness directives (AD), Part 90 requirements and airworthiness requirements associated with operational approvals.
Airworthiness standards	The design and safety standards applicable to the aircraft or aeronautical product for approval or certification under Part 21. Airworthiness standards for type certificated aircraft, aircraft engines and propellers are set out in Parts 22 to 35.
Airworthy	An aircraft or aeronautical product is airworthy if it is in a state that conforms with its approved design and is in a condition for safe operation.
Appliance	Any instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communication equipment, that is used or intended to be used in operating or controlling an aircraft in flight, is installed in or attached to the aircraft, and is not part of an airframe, engine or propeller. ³
Approved design	Approved design means: <ul style="list-style-type: none"> (a) for a type certificated aircraft, aircraft engine or propeller: <ul style="list-style-type: none"> (i) the type design for the aircraft, engine or propeller; and (ii) any changes to the type design made in accordance with an approval under Part 21 (b) for an aeronautical product, other than an aircraft engine or propeller, that is approved in a manner mentioned in regulation 21.305 or 21.305A: <ul style="list-style-type: none"> (i) the design specifications for the product; and (ii) any changes to the design specifications made in accordance with an approval under Part 21 (c) for an aircraft or aeronautical product not mentioned in (a) or (b): <ul style="list-style-type: none"> (i) the design that applied to the original certification (however described) of the aircraft or aeronautical product; and (ii) any changes to the design made in accordance with an approval under Part 21.
Approved design organisation (ADO)	A design organisation approved under Subpart 21.J to carry out design activities under Part 21. An ADO's scope of approval may include approval and certification activities for modification/repair designs under Subpart 21.M.

¹ See section 3 of the *Civil Aviation Act 1988*.

² See regulation 2 of CAR

³ See CASR Dictionary.

Term	Definition
Certification activity	A process wherein an application for a design approval has been made to CASA, CASA authorises an ADO to assess the design for compliance with the applicable airworthiness requirements, the ADO provides a certificate to CASA in relation to the compliance of the design, and CASA may approve the design based on the certificate from the ADO. ⁴
Certification basis	Certification basis means: <ul style="list-style-type: none"> (a) for an aircraft, aircraft engine or propeller for which there is a type certificate or type acceptance certificate—the type certification basis for the aircraft, aircraft engine or propeller; and (b) for an aeronautical product, other than an aircraft engine or propeller, that is approved in a manner mentioned in regulation 21.305 or 21.305A—the airworthiness standards that applied for certification of the product; and (c) for an aircraft or aeronautical product not mentioned in (a) or (b) above—the airworthiness standards that applied for certification of the aircraft or aeronautical product (however described).
Certification plan	A document that identifies: <ul style="list-style-type: none"> (a) a brief description of the intended modification/repair design (b) the applicable airworthiness standards (c) the compliance plan – the means and methods by which an aircraft or aeronautical product will be shown to comply with the applicable airworthiness requirements (d) the certification activities (ADO) or agreed level of delegation or authorisation granted to the applicant for each applicable requirement (e) the agreed level of involvement of certification team members (CASA specialists and ADO/authorised persons) for each applicable requirement (f) communication plan, describing communication and coordination responsibilities between applicant, CASA, ADO, authorised persons and suppliers, as applicable (g) project schedule, including major milestones and deliverables.
Commercial/off-the shelf part	A part that is to be used in an aircraft but: <ul style="list-style-type: none"> (a) the product design has not been approved under Part 21; (b) was not produced under a Part 21 production approval; and (c) is not a standard part.
Compliance summary	A report that describes the airworthiness requirements that are applicable to the design and how compliance with those requirements was shown. It is used to ensure, systematically and comprehensively, that a design complies with all applicable airworthiness requirements. A compliance summary is also called a compliance check list.
Equivalent Level of Safety	A finding where literal compliance with an applicable airworthiness standard cannot be demonstrated but compensating factors exist in the design that can be shown to provide a level of safety equivalent to that intended by the standard.
Modification	A change to the design of an aircraft or aeronautical product which is not a repair.
Modification/repair design approval	An approval granted under regulation 21.435 or 21.437.
Person	An individual or body corporate.

⁴ See AC 21.J-01 for more information on certification activities.

Term	Definition
Repair	The restoration of an aircraft or aeronautical product to an airworthy condition. This AC deals with repairs that involve a design change.
Special Conditions	The technical requirements added to the certification basis because of novel or unusual design feature(s) that exists in a type design and the absence or inadequacy of the applicable airworthiness standards to provide a basis for the certification of such features.
Supplemental type certificate (STC)	An approval issued by CASA under Subpart 21.E of a major modification or repair of a type certificated aircraft, engine or propeller.
Technical data	The data that describes and shows compliance of a design. ⁵
Type acceptance certificate (TAC)	A document issued by CASA to accept the design of a type of aircraft, aircraft engine or propeller approved via a foreign type certificate.
Type certificate (TC)	A document issued by CASA to define the design of a type of aircraft, aircraft engine or propeller and to certify that the design meets the applicable airworthiness requirements.
Type certificate data sheet	A document that forms part of the type certificate providing the technical details and limitations of the aircraft, aircraft engine or propeller.
Type certification basis	The airworthiness standards and any special conditions or other conditions with which the aircraft, aircraft engine or propeller must comply for the issue of a type certificate.
Type design	The basic design of a type certificated aircraft, aircraft engine or propeller.

⁵ See regulation 21.008 for more information on technical data.

1.3 References

Regulations

Regulations are available on the ComLaw website <http://www.comlaw.gov.au/Home>

Document	Title
Part 21 of CASR	Certification and airworthiness requirements for aircraft and parts
CASR Dictionary	

CASA advisory material

CASA's advisory material is available at http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90902

Document	Title
AC 21.J-01	Approved design organisations
AC 21-09	Special flight permits
AC 21.6	Restricted category aircraft – certification
AC 21-12	Classification of design changes
AC 21-14	Production certificates
AC 21-15	Supplemental type certificates
AC 21.16	Approval of Materials, Parts, Processes and Appliances;
AC 21.27	Manufacturing approval — overview
AC 21-28	Permissible unserviceabilities - unrepaired defects (r.21.007)
AC 21-23	Technical data
AC 21-601	Australian Technical Standard Order Authorisation
CAAP 54-1	Flight manuals for individual aircraft

International agreements

International agreements are available at http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90820

1.4 Forms

CASA's forms are available at http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_91308

Form number	Title
CASA Form 655	Design Advice
CASA Form 979	Statement of Compliance

2 Background

2.1 Introduction

2.1.1 Design changes to Australian aircraft must be approved under Part 21 (excluding certain aircraft that are exempt from the regulations, such as aircraft operating under a recreational aviation administration organisation).⁶ Design changes may be modifications or repairs for reasons such as to rectify defects, change or improve parts or equipment, comply with enhanced safety requirements, provide for different aircraft utilisation or address operators' commercial requirements.

2.1.2 Subpart 21.D provides for approval of design changes to type certificated aircraft, aircraft engines and propellers as a change in type design. The provisions of Subpart 21.D are for design changes proposed by the type certificate holder.

2.1.3 Subpart 21.E provides for approval of major design changes to type certificated aircraft, aircraft engines and propellers under an STC. See AC 21-15 for more information on STCs.

2.1.4 Subpart 21.M provides the general requirements for approval of modification and repair designs for aircraft, aircraft engines, propellers and appliances. The requirements of Subpart 21.M for assessment and approval of a repair are the same as for a modification.

2.1.5 Repairs

2.1.5.1 A repair, in the context of this AC, is a design change to an aircraft or aeronautical product intended to restore it to an airworthy condition after it has suffered a defect.

2.1.5.2 A repair may be permanent or temporary.

Note: Aircraft return to service without repair cannot be approved under Subpart 21.M, nor can damage or a defect be considered a modification. See AC 21-28 for more information on approval of permissible unserviceabilities under regulation 21.007.

2.1.6 Modifications

2.1.6.1 A modification is a change to the design of an aircraft or aeronautical product which is not a repair.

2.1.6.2 A modification may be any one or a combination of a physical design change, or a change to an operating envelope, performance, operating characteristics, limitations or ICA. The change can be a single change or a collection of changes.

2.1.6.3 Approval of an aeronautical product (including materials) as an alternative to an aeronautical product specified in the approved design of an aircraft or another aeronautical product may also be approved as a modification under Subpart 21.M. See subsection 4.4 for more information on approval of alternative products.

Note: Approval under Subpart 21.M does not constitute approval for the purposes of approval of required instruments or equipment under the operational regulations (e.g. regulation 207 of CAR).

2.1.6.4 A modification/repair design may provide for the use of commercial/off-the-shelf (COTS) parts. However, the showing of compliance approved under regulation 21.009 for the design must include the part(s). See subsection 4.3 for more information on COTS.

⁶ See regulation 42.125 and regulation 42U of CAR.

3 Other information relevant to modification/repair design approvals

3.1 Design advice

3.1.1 Design advice purpose and policy

3.1.1.1 CASA Form 655 – Design Advice, is the primary means of obtaining advice or a determination from CASA in relation to design activities. A design advice (DA) may be submitted if an ADO or authorised person requires advice from CASA in relation to any matter associated with a modification/repair design. The following primary reasons for a DA in relation to a modification/repair design are outlined in the following paragraphs:

- a. major alteration (repair or modification)
- b. major/minor determination by CASA
- c. application for design standard
- d. application for equivalent safety determination [CASR 21.437(6)]
- e. determination of inappropriate design requirement [CASR 21.416]
- f. other.

3.1.2 Major alteration

3.1.2.1 A DA may be submitted when the ADO or authorised person has classified the proposed modification/repair design as major and requires advice as to whether the design should be processed under Subpart 21.M or as an STC.

3.1.2.2 The ADO or authorised person must include with the DA application, a brief description of the proposed modification/repair design and a copy of the compliance plan.

3.1.2.3 CASA will consider the DA application and determine whether the design should be processed as a modification/repair design under Subpart 21.M or an STC under Subpart 21.E. The determination will be based on the design and the qualifications, experience and knowledge of the ADO or authorised person. See AC 21-15 for more information on STCs.

3.1.2.4 If CASA is satisfied that the design is appropriate for assessment and approval by the ADO or authorised person under Subpart 21.M, then CASA will carry out a technical review of the proposed airworthiness standards for the design and the compliance plan. If CASA is satisfied that the proposed airworthiness standards and the compliance plan are acceptable, then CASA will provide the applicant with a DA response that authorises the ADO or authorised person to approve the design under Subpart 21.M, subject to any conditions specified by CASA in the response. If CASA is not satisfied that the proposed airworthiness standards or the compliance plan are acceptable, then the DA response will outline the reasons.

3.1.3 Major/minor determination by CASA

3.1.3.1 A DA may be submitted if the ADO or authorised person requires advice from CASA in relation to making a major/minor determination for a proposed modification/repair design.

3.1.3.2 The ADO or authorised person must provide with the DA application, a brief description of the proposed modification/repair design, a draft determination and an outline of the reasons why there is uncertainty in making the determination.

3.1.3.3 CASA will consider the DA application and determine whether the proposed modification/repair design should be classified major or minor and advise the applicant accordingly in the DA response.

3.1.3.4 If the classification is major then the applicant may submit an application for an STC under Subpart 21.E or may submit a DA application for approval to process the design under Subpart 21.M (see subsection 3.1.2).

3.1.4 Application for design standard

3.1.4.1 A DA may be submitted if the ADO or authorised person requires advice from CASA to determine the applicable airworthiness standards for a proposed modification/repair design.

3.1.4.2 The ADO or authorised person should provide with the DA application a brief description of the proposed modification/repair design, the proposed airworthiness standards and outline the reasons why there is uncertainty with regard to the applicability of the standards.

3.1.4.3 CASA will consider the DA application and determine the applicable airworthiness standards and advise the applicant accordingly in the DA response.

3.1.5 Application for equivalent safety determination

3.1.5.1 A DA should be submitted if the ADO or authorised person requires CASA to make or agree with an equivalent level of safety determination under regulation 21.436 for a proposed modification/repair design.

3.1.5.2 The ADO or authorised person should provide with the DA application a brief description of the proposed modification/repair design, details of the applicable airworthiness standards with which the design does not comply and an equivalent level of safety proposal that clearly shows how the non-compliance is compensated for. See subsection 5.12.5 for the information required for an equivalent level of safety determination.

3.1.5.3 CASA will consider the DA application and make a determination or decision on the proposed equivalent level of safety and advise the applicant accordingly in the DA response.

3.1.6 Determination of inappropriate design requirement

3.1.6.1 A DA should be submitted if the ADO or authorised person requires CASA to either:

- a. make a determination under regulation 21.416 that an airworthiness standard does not apply to a proposed modification/repair design
- b. approve under regulation 21.418 a determination made by an ADO or authorised person that an airworthiness standard does not apply to a proposed modification/repair design.

3.1.6.2 The ADO or authorised person should provide with the DA application a brief description of the proposed modification/repair design, details of the airworthiness standards that do not apply to the design and the reasons why the airworthiness standards do not apply.

3.1.6.3 CASA will consider the DA application and make a determination or decision on the proposed non-application of the standards and advise the applicant accordingly in the DA response.

3.1.7 Other

3.1.7.1 A DA should be submitted if an ADO or authorised person requires advice from CASA in relation to any other matter not covered by the other reasons.

3.2 Use of service experience in the design and approval process

3.2.1 Service experience may be used to support qualitative analyses, assumptions and engineering judgements that may be necessary for the design and approval of modification/repairs under Subpart 21.M. However, for service history to be acceptable, the data must be both sufficient and pertinent. The essentials of the process involve:

- a. a clear understanding of the relevant airworthiness requirements and standards, their purpose and the hazards addressed
- b. a detailed knowledge of the design
- c. the availability of pertinent and sufficient service experience data
- d. a comprehensive review of that service experience data.

3.2.2 The applicant should:

- a. provide data for the design pertinent to the requirement
- b. provide service experience from such data sources as the following:
 - i. accident reports
 - ii. incident reports
 - iii. service bulletins
 - iv. ADs
 - v. repairs
 - vi. modifications
 - vii. flight hours/cycles for fleet leader and total fleet
 - viii. world airline accident summary data
 - ix. service difficulty reports
 - x. transport safety agency reports
 - xi. warranty, repair and parts usage data
 - xii. aircraft/engine/product reliability and engine trend monitoring reports
 - xiii. scheduled and unscheduled maintenance finding reports
 - xiv. relevant data pertaining to aircraft or products of similar design and construction may be included.
- c. show that the data presented represent all relevant service experience for the product, including the results of any operator surveys, and is comprehensive enough to be representative
- d. show that the service experience is relevant to the design/requirement/standard/hazard
- e. provide documentation to support identification and evaluation of each of the main areas of concern with regard to:
 - i. recurring and/or common failure modes
 - ii. cause
 - iii. probability, by qualitative reasoning
 - iv. measures already taken and their effects
- f. provide documentation to support evaluation of failure modes and consequences through analytical processes. The analytical processes should be supported by:
 - i. a review of previous test results;
 - ii. additional detailed testing as required; or

- iii. a review aircraft functional hazard assessments (FHA) and any applicable system safety assessments (SSA) as required
- g. provide documentation adequate to support a conclusion that draws together the data and the rationale.

Note: These guidelines are not limiting, either in setting required minimum elements or in precluding alternative methods. Each case may be different, based on the particulars of the design/system being examined and the requirement to be addressed.

Example

3.2.3 Engine reliability and trend monitoring data can be used to support an engine modification approval process. However, in order to use this data to support showing compliance with the requirements of regulations related to endurance tests, a clear and without any doubt relationship must be established between any part of the data and every part of the endurance test. It may be difficult to find relevant data for parts of the test that include engine runs at 105% or 108% (in which case specific tests may be necessary).

3.3 Unsafe feature or characteristic analysis

3.3.1 This is a separate condition from compliance with the applicable airworthiness standards because in some cases an unsafe condition may exist even though the design complies with the applicable airworthiness standards. The design standards against which designs are approved are intended to address the vast majority of unsafe situations. These standards develop over time to cover previously unforeseen unsafe conditions, new materials and innovative technologies. Hence, design standards always lag behind technology and it cannot be assumed that the design standards are comprehensive.

3.3.2 The unsafe feature or characteristic analysis is of particular significance when a modification/repair design is for (or incorporates) an aircraft or aeronautical product to be used in a way which was not envisaged by the original designer.

3.3.3 An unsafe feature or characteristic includes:

- a. a feature or characteristic that may lead to an event that would:
 - i. result in fatalities, usually with the loss of the aircraft; or
 - ii. reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions to the extent that there would be:
 - A. a large reduction in safety margins or functional capabilities;
 - B. physical distress or excessive workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely; or
 - C. serious or fatal injury to one or more occupants;unless it is shown that the probability of such an event is within the limit defined by the applicable airworthiness standards;
- b. a feature or characteristic that too frequently (i.e. significantly beyond the applicable safety objectives) leads to events having less severe immediate consequences than those listed above but:
 - i. could eventually lead to one of the consequences listed above in specific operating environments; or
 - ii. may reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions to the extent that there would be, for example:

- A. a significant reduction in safety margins or functional capabilities;
- B. a significant increase in crew workload, or in conditions impairing crew efficiency; or
- iii. discomfort to occupants, possibly including injuries;
- c. a feature or characteristic with which there is an unacceptable risk of serious or fatal injury to persons other than occupants; or
- d. design features intended to minimise the effects of survivable accidents not performing their intended function.

3.3.4 The analysis may be qualitative or quantitative. In cases where formal and quantitative safety analyses are not available, as will be the case for the majority of modification/repair designs, the level of analysis should be consistent with that required by the applicable airworthiness standards and may be based on engineering judgement supported by service experience data. The analysis may assume the following:

- a. that the crew has the skill to apply the necessary procedures correctly, but without requiring exceptional piloting skill, alertness or strength
- b. that the aircraft is maintained in accordance with the applicable maintenance programme and ICA
- c. that the aircraft has been modified in accordance with the applicable instructions.

3.3.5 If an ADO or authorised person concludes that an unsafe situation might exist then the design may not be approved until the unsafe feature or characteristic has been adequately addressed, for example by modification of the design or additional procedures, personnel, training or documentation.

3.4 Modification/repair design approvals for foreign or state aircraft

3.4.1 The regulations do not prevent the issue of an approval under regulations 21.009 or 21.437 to a foreign or state aircraft, aircraft engine, propeller or appliance.

3.4.2 This is because the registration status of an aircraft has no bearing from a safety perspective on the question of whether the approval should be granted. It also reflects the reality that design approvals may be sought at a time before the aircraft to which they will apply are registered at all.

3.4.3 However, the ADO or authorised person must comply with any conditions specified in their exposition and design assurance system manual, or instrument of appointment, as applicable.

3.4.4 Furthermore, an approval granted under Australian civil legislation may be of no effect under the legislative regime which applies to the particular foreign or state aircraft, aircraft engine, propeller or appliance (it is the responsibility of the applicant, owner or operator, not the approver, to make this determination). An approval granted for a foreign or state aircraft, aircraft engine, propeller or appliance should include the following statement (or similar): 'This approval is granted under Subpart 21.M of the Australian CASR. It is the responsibility of the owner/operator to determine whether this approval requires additional approval under their relevant regulations.'

4 Approval and production of parts for a modification/repair design

4.1 General

4.1.1 A modification/repair design approval is approval of a design or a design change for the purposes of incorporation/installation on an aircraft, aircraft engine, propeller or appliance.

4.1.2 A modification/repair design approval does not constitute approval for the purposes of approval of required instruments or equipment under the operational regulations (e.g. regulation 207 of CAR).

4.1.3 A modification/repair design approval does not constitute an approval to produce/fabricate/manufacture the parts associated with the design.

4.1.4 Parts that are aeronautical products⁷ or aircraft components⁸ are subject to the normal requirements for production and installation – they may only be made by a production or maintenance organisation that holds the necessary approvals and must be installed in accordance with regulation 42.420 or regulation 42W of CAR.

4.2 Production of parts

4.2.1 Parts for a modification/repair design may be produced by the following means, or a combination thereof (see AC 21.27 for more information on manufacturing approvals):

- a. Production certificate
- b. FITCOM/MITCOM
- c. Australian Parts Manufacturing Approval (APMA) – see also AC 21-16
- d. Australian Technical Standard Order authorisation (ATSOA) – see also AC 21-601.

4.2.2 Production certificates

4.2.2.1 Production certificates under Subpart 21.G may be obtained for production of parts included in a modification/repair design.

4.2.2.2 A one-off production certificate may be granted in cases where the application is limited, but the parts are not within the scope of FITCOM/MITCOM. For example, a major repair that includes a Class II product.

4.2.2.3 See AC 21-14 for more information on production certificates.

4.2.3 FITCOM/MITCOM.

4.2.3.1 Certain kinds of parts may be fabricated or manufactured in the course of maintenance (FITCOM/MITCOM) by a maintenance organisation. FITCOM applies for Part 42 aircraft and Part 145 Approved maintenance organisations (AMO); MITCOM applies to maintenance organisations holding an approval under regulation 30 of CAR and aircraft subject to Part 4A of CAR.

⁷ See section 3 of the *Civil Aviation Act 1988* and clause 1, Part 2 of the CASR Dictionary.

⁸ See regulation 2 of CAR.

4.2.3.2 FITCOM/MITCOM is for simple Class III products that are to be used on an aircraft on which the maintenance organisation is carrying out maintenance (e.g. hoses, brackets, cables) – parts made under FITCOM/MITCOM cannot be issued an authorised release certificate and cannot be onsold.

4.2.3.3 See the Part 145 AMC/GM and CAAP 30-4 for more information on FITCOM and MITCOM respectively.

4.3 Commercial/off-the-shelf parts

4.3.1 COTS parts are parts that:

- a. the product design has not been approved under Part 21;
- b. have not been produced under a Part 21 production approval; and
- c. are not standard parts.

4.3.2 A modification/repair design may include COTS parts; however, the requirements for approval of the design apply to the whole design, including the COTS part.

4.3.3 Consideration must also be given to continuing airworthiness and maintenance requirements; in particular, instructions for continuing airworthiness (ICA) and the need for an authorised release certificate for installation of aeronautical products⁹ and aircraft components¹⁰.

Note: Approval under Subpart 21.M does not constitute approval for the purposes of approval of required instruments or equipment under the operational regulations (e.g. regulation 207 of CAR).

Example – COTS camera

4.3.4 A modification design may provide for installation of a COTS camera on an aircraft. The applicant must show that the aircraft with the design incorporated (i.e. with the camera and any attaching hardware installed) would comply with the applicable airworthiness standards. For example: if the camera is mounted internally then flammability requirements must be considered; and if the camera is mounted externally then aerodynamic effects must be considered.

4.4 Approval of alternative parts and materials

4.4.1 A modification/repair design approval may be used to approve an aeronautical product (including parts and materials and software) as an alternative to an aeronautical product specified in the approved design of an aircraft, aircraft engine, propeller or appliance.

4.4.2 Such approvals are granted as a modification of the aircraft, aircraft engine, propeller or appliance on which the alternative product may be fitted or used, and therefore, under paragraph 21.440(c), the approval must specify the aircraft, aircraft engine(s), propeller(s), or appliance(s) on which the alternative product may be fitted or used.

Note: Approval under Subpart 21.M does not constitute approval for the purposes of approval of required instruments or equipment under the operational regulations (e.g. regulation 207 of CAR).

⁹ See Division 42.E.2.

¹⁰ See regulation 42W of CAR.

5 Advisory material for Subpart 21.M and associated regulations

5.1 Regulation 21.003 – Reporting failures, malfunctions, and defects

5.1.1 Subregulation 21.003(2A) requires the holder of a modification/repair design approval to report to CASA any failure, malfunction or defect related to the approval. CASA's service difficulty reporting (SDR) system is the appropriate means for reporting these defects, failures or malfunctions.

5.2 Regulation 21.006A – approval of changes to aircraft flight manuals

5.2.1 Regulation 21.006A sets out who may apply for the approval of a change to an aircraft flight manual (AFM) and provides for CASA, an ADO or an authorised person to approve a change to an AFM or a change to an AFM supplement.

5.2.2 If a modification/repair design necessitates a change to the AFM for the applicable aircraft, then the AFM change must be approved under this regulation.¹¹

5.2.3 The applicant for the modification/repair design approval or the registered operator of the aircraft may apply (in writing) for a change to the AFM.

5.2.4 In order for the change to be approved, the applicant must satisfy CASA, the ADO or authorised person (as applicable) that the manual, as changed, would comply with the applicable airworthiness standards.¹² For type certificated aircraft this should include 23.1581, 25.1581, 27.1581 or 29.1581 (or similar, as applicable).

5.2.5 The showing of compliance for a change to an AFM should be covered in the technical data approved under regulation 21.009 for the modification/repair design.

5.2.6 The AFM amendment or supplement should be in the same format and structure as the existing AFM, and should clearly specify the modification/repair design to which the amendment or supplement relates.

5.2.7 If the aircraft does not have an AFM and a modification/repair design affects the information that would normally be contained in an AFM, then an AFM supplement may be approved under this regulation. However, if the information that would normally be provided in an AFM is provided by placards in the aircraft, and a modification/repair design necessitates a physical change to the placards, then that change should be approved as part of the modification/repair design under regulation 21.435 or 21.437.

5.2.8 See CAAP 54-1 for more detailed information on AFMs.

Note 1 An authorisation to approve a modification/repair design does not imply an authorisation to approve a change to an AFM. The authorisation to approve a change to an AFM under this regulation must be specifically granted by CASA, either under an ADO approval certificate or an instrument of appointment.

Note 2 It is the responsibility of the holder of the modification/repair design approval to ensure that any subsequent required changes to the AFM (e.g. as a result of defects or changes to the design) are approved under this regulation and provided to the registered operator of the aircraft.¹³

¹¹ See also subregulation 21.420(2).

¹² See regulations 21.403 and 21.405 for more information on applicable airworthiness standards.

¹³ See regulation 21.460.

5.2.9 When a change to a flight manual is required for a modification/repair design

5.2.9.1 A change to a flight manual must be developed and approved under this regulation for:

- a. designs that result in a change to limitations, procedures, performance, or loading information specified in the current AFM, pilot's operating handbook (POH) or placards
- b. designs that include new equipment, modify equipment or change the crew/aircraft interface or the aircraft configuration and for which the pilot would need additional information as to the operation of the equipment or the aircraft.

5.2.9.2 Designs that do not result in a change to limitations, procedures, performance, or loading information may not require a supplement or the supplemental information may consist of system operating instructions only. In this case the equipment manufacturer's operating manual containing detailed instructions may be incorporated by reference into an AFM supplement.

5.2.9.3 If all of the following conditions are met, then an AFM supplement is not required:

- a. the design does not change limitations, procedures, performance, or loading information, specified in the current AFM, POH or placards
- b. the design does not restrict, displace, or limit the use of required equipment
- c. all new limitations can be addressed via placards
- d. the aircraft performance is not negatively affected
- e. a placard is not required by the TC or STC
- f. the aircraft or the affected equipment is for VFR use only
- g. the design affects/involves only non-required equipment.

Example – design for installation of alternative non-required avionics equipment

5.2.9.4 If there is already mention of the original equipment in the current AFM, then a supplement would be required to amend that information. If the current AFM does not mention the original equipment and the design does not affect the information in the current AFM, then an AFM supplement would not be required.

5.3 Regulation 21.009 – approval of technical data

5.3.1 The technical data for a modification/repair design must include all the data that:

- a. describes the design; and
- b. shows that the design complies with the applicable airworthiness standards.¹⁴

5.3.2 The following paragraphs provide an overview of technical data for modification/repair design approvals. See AC 21-23 for more detailed information on technical data.

5.3.3 Under regulation 21.420, the applicant for a modification/repair design approval must provide all the technical data for the design for approval under regulation 21.009.

5.3.4 Regulations 21.435 and 21.437 require the technical data for the design to have been approved under regulation 21.009 in order for the modification/repair design to be approved. The technical data for a modification/repair design must be of a standard that is appropriate for the scope, complexity and criticality of the design.

¹⁴ See regulation 21.008 for the meaning of technical data.

5.3.5 Technical data must cover all the design changes to be approved as a part of the modification/repair design and all the compliance requirements for each of those changes, including the major/minor classification, limitations, changes to the AFM, production data and the instructions for continuing airworthiness (ICA) for the design.

5.3.6 Technical data must be approved by an individual who holds the necessary authorisation in the relevant engineering speciality.¹⁵

5.3.7 The technical data package for a design may be provided as a set of multiple approvals (for example, if the design involves multiple specialities).

5.3.8 The technical data for a modification/repair design may be approved by the same individual who approves the modification/repair design under regulation 21.435 or 21.437, or a different individual. If the same individual is to approve both the technical data and the modification/repair design then both approvals may be granted at the same time; however, the approval of the technical data under regulation 21.009 is a distinct approval under the regulations and this must be evident on the approval document (e.g. a single signature on the design approval package may be used to approve both the technical data under 21.009 and the modification/repair design under 21.437, provided the document clearly states that the approval is for both the technical data under 21.009 and the modification/repair design under 21.437).

5.3.9 A technical data approval covers only what is specified in the approval document – this may or may not be the complete technical data for a modification/repair design. Therefore, a technical data approval document must clearly specify what the approval covers.

5.3.10 It is the responsibility of the person granting the modification/repair design approval under regulation 21.435 or 21.437 to ensure that the technical data package for the particular modification/repair design covers all the relevant requirements and has the necessary approvals.

5.4 Regulation 21.010 – References to modifications and repairs in Part

5.4.1 Regulation 21.010 provides that a reference to a modification of, or repair to, an aircraft, aircraft engine, propeller or appliance includes a reference to a modification of, or repair to, an aeronautical product for the aircraft, aircraft engine, propeller or appliance; regardless of whether, at the time of the modification or repair, the aeronautical product was fitted to the aircraft, aircraft engine, propeller or appliance.

Example

5.4.2 A modification/repair design for an aircraft flap – the flap does not have to be fitted to the aircraft when the modification or repair is approved and incorporated on the flap.

¹⁵ See AC 21.J-01 for more information on engineering specialities.

5.5 Regulation 21.402 – Definition of proposed airworthiness standards for Subpart 21.M

5.5.1 Under regulation 21.405, the applicant for an approval of a modification/repair design must specify the proposed airworthiness standards for the design in the application.

5.5.2 Regulation 21.402 provides the definition of proposed airworthiness standards that applies for Subpart 21.M. This definition should be read in conjunction with subregulations 21.405(3) and (4), which provide additional requirements in relation to what the proposed airworthiness standards must be for a particular modification/repair design (see relevant guidance in paragraph 5.7.3 below).

5.6 Regulation 21.403 – Definition of applicable airworthiness standards for Subpart 21.M

5.6.1 Regulation 21.403 provides the definition of applicable airworthiness standards that applies for Subpart 21.M. This definition should be read in conjunction with the definition of proposed airworthiness standards in regulation 21.402 and also subregulations 21.405(3) and (4), which provide additional requirements in relation to what the proposed airworthiness standards must be for a particular modification/repair design (see subsection 5.7.3).

5.6.2 The definition also provides for the following determinations:

- a. a determination under regulation 21.414 that additional standards apply to the design (see subsection 5.9)
- b. a determination under regulation 21.416 or 21.418 that certain standards do not apply to the design (see subsections 5.10 and 5.11).

5.7 Regulation 21.405 – Applications for modification/repair design approvals

5.7.1 Who may be the applicant

5.7.1.1 Any person (individual or body corporate) may be the applicant for a modification/repair design approval.

5.7.1.2 If the modification/repair design is approved, then the applicant becomes the holder of the modification/repair design approval.

5.7.1.3 There is no restriction on the relationship between the applicant and the ADO or authorised person who approves the application (i.e. the applicant and the approver may be the same person or different parts of the same organisation).

5.7.2 Form of application

5.7.2.1 An application for a modification/repair design must:

- a. be in writing, which includes in an electronic form
- b. be in the approved form – an application submitted to CASA should be made on Form 442. An ADO or an authorised person may develop their own form for applicants to use, provided all the required information is covered
- c. include all the information required by the regulations:
 - i. the applicant's name and contact details

- ii. the make, model and serial number of each aircraft, aircraft engine, propeller or appliance to which the design relates
 - A. an application may be for a single item or multiple types, models or serial numbers
 - B. if an application is for more than one aircraft or aeronautical product then the application need not state each particular registration or serial number individually, but must include a statement that enables accurate identification of the aircraft, aircraft engines, propellers or appliances to which the application applies
 - iii. a description of the modification or repair
 - iv. the proposed airworthiness standards for the design
 - v. an outline of the means for demonstrating compliance with the proposed airworthiness standards
- d. be accompanied by every document required by the regulations – this includes all the technical data for the design.

5.7.3 Subregulation 21.405(3) and (4) – proposed airworthiness standards

5.7.3.1 For an aircraft, aircraft engine or propeller for which there is a TC, TAC or foreign type certificate, the proposed airworthiness standards for the design must be:

- a. either:
 - i. the airworthiness standards that applied to the issue of the TC, TAC or foreign type certificate, or
 - ii. a specified later version of those standards; and
- b. any other standards that the applicant considers to be directly related to those standards.

5.7.3.2 For an aircraft, aircraft engine or propeller for which there is no TC, TAC or foreign type certificate, or an appliance, the proposed airworthiness standards for the design must be:

- a. either:
 - i. the airworthiness standards that applied to the original certification (however described) of the aircraft, aircraft engine, propeller or appliance; or
 - ii. a specified later version of those standards; and
- b. any other standards that the applicant considers to be directly related to those standards.

5.7.3.3 Under regulation 21.010, the proposed airworthiness standards for an appliance for a type certificated aircraft, aircraft engine or propeller must include the applicable type certification standards.

5.7.3.4 See AC 21-12 for more information on establishing the certification basis for design changes.

5.8 Regulation 21.410 – Refusal to grant approval if design constitutes major change in type design

5.8.1 CASA, the ADO or authorised person may refuse to grant approval for the design under Subpart 21.M without further consideration if the design would constitute a major change in a type design. However, CASA, the ADO or authorised person must provide the applicant the reasons for the decision.¹⁶

5.8.2 A major change in a type design should generally be processed as a STC. However, certain major changes that are not significant or substantial changes may be approved under Subpart 21.M by an ADO or authorised person in the following circumstances:

- a. the applicable approval certificate or instrument of appointment specifically mentions that the ADO or authorised person may approve major changes of that kind; or
- b. CASA has specifically authorised the ADO or authorised person to approve the design under Subpart 21.M. Such an authorisation would normally be in the form of a response to a DA (see subsection 3.1 for more information about a DA).

5.8.3 General examples of design changes that should be processed as an STC include:

- a. the design introduces a significant change to the data or limitations mentioned in the TC or type acceptance certificate for the aircraft, aircraft engine or propeller
- b. the design changes airworthiness limitations or certification maintenance requirements (CMR) for the aircraft, aircraft engine or propeller
- c. the design is a major change for more than one aircraft, aircraft engine or propeller serial number
- d. the parts to be manufactured for the design are complex, exceeding what would be appropriate for FITCOM/MITCOM or a one-off production certificate.

5.8.4 Major/minor classification of designs

5.8.4.1 A minor change is one that has no appreciable effect on the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the airworthiness of an aircraft, aircraft engine or propeller.¹⁷ The following items should be considered for the classification:

- a. Structural performance. Structural performance includes static strength, fatigue, damage tolerance, flutter and stiffness characteristics. Changes to any element of the structure should be assessed for their effect upon the structural performance.
- b. Weight and balance. The weight of the change may have a greater effect upon smaller aircraft as opposed to larger aircraft. The effects to be considered are related to overall aircraft centre of gravity and aircraft load distribution. Control surfaces are particularly sensitive to the changes due to the effect upon the stiffness, mass distribution and surface profile which may have an effect upon flutter characteristics and controllability.
- c. Systems. Changes to any elements of a system should be assessed for the effect intended on the operation of the complete system and for the effect on system redundancy and reliability. The consequence of a structural change on an adjacent

¹⁶ See regulation 11.060.

¹⁷ See regulation 21.093 for the meaning of minor change.

or remote system should also be considered as above, (for example: airframe change in area of a static port).

- d. Operational characteristics, including:
 - i. stall characteristics
 - ii. handling
 - iii. performance and drag
 - iv. vibration.
- e. Other characteristics, including:
 - i. changes to load path and load sharing
 - ii. change to noise and emissions
 - iii. fire protection / resistance.

Note: Considerations for classifying design changes 'major/minor' should not be limited to those listed above – the classification must thoroughly consider all the effects of the design, including any unique or novel features or characteristics.

5.8.4.2 If it cannot be shown that the modification/repair design has no appreciable effect on the above then it should be classified major.

5.8.4.3 Changes that require a re-assessment and re-evaluation of the original certification substantiation data to ensure that the aircraft still complies with all the relevant requirements are to be classified major.

5.8.4.4 All previous related design changes and the amendment level of the certification basis for these changes should also be considered for the classification.

5.8.4.5 It is understood that in many cases not all the certification substantiation data will be available to the ADO or authorised person classifying a design change. In cases where the certification substantiation data is not available a qualitative engineering judgement, supported by service experience where possible, of the effects of the design will be acceptable for the initial classification. However, if it is subsequently found that any of these judgements are no longer valid, then the classification must be reviewed and reclassified if necessary.

5.8.4.6 See AC 21-12 for more detailed information on classification of design changes.

5.9 Regulation 21.414 – Determination of additional airworthiness standards—special conditions

5.9.1 If CASA, the ADO or authorised person is not satisfied that the proposed airworthiness standards for the design provide an adequate safety standard for the design in a particular respect then they may determine additional airworthiness standards for the design.

5.9.2 The additional airworthiness standards may be either, or a combination, of the following:

- a. later versions of the proposed airworthiness standards
- b. special conditions.

5.9.3 The additional airworthiness standards must be appropriate to provide a level of safety for the aircraft, aircraft engine, propeller or appliance equivalent to the level of safety required by the regulations for a comparable aircraft, aircraft engine, propeller or appliance. The objective is to achieve a level of safety consistent with that provided for:

- a. other areas, systems, components, equipment, or appliances affected by the change, by the other requirements of the proposed airworthiness standards; or
- b. another aircraft, engine or propeller or appliance certified to the same airworthiness standards (at the same version).

5.9.4 In any case, the overall level of safety should not be reduced relative to the proposed airworthiness standards (see regulation 21.405 for the requirements for the proposed airworthiness standards).

5.9.5 CASA, the ADO or authorised person must notify the applicant, in writing, of any additional airworthiness standards that are determined to apply to the design.

5.9.6 Later versions of the proposed airworthiness standards

5.9.6.1 If additional airworthiness standards are required for the design, then the ADO or authorised person should first consider later versions of the proposed airworthiness standards, beginning with the proposed airworthiness standards and progressing to the most appropriate later amendment level for the design.

5.9.6.2 If there are no airworthiness standards at any version that adequately address the design then special conditions will be required.

5.9.7 Special conditions

5.9.7.1 Special conditions may be required if there are no airworthiness standards at any version that adequately address the particular features or characteristics of the design. This may occur in situations such as:

- a. the design contains novel or unusual features
- b. the design is for an unconventional use of the aircraft or product
- c. service experience from other aircraft or products that have similar design features has shown that unsafe conditions may develop.

5.9.8 Airworthiness directives

5.9.8.1 A check of current ADs, including exclusions or alternative means of compliance, should be carried out to ensure that the proposed modification or repair does not impact on the requirements of any applicable ADs. If the modification/repair design conflicts with the requirements of an AD, then it will be necessary to include additional airworthiness standards or special conditions, or alter the proposed modification/repair design so that it is not in conflict with the AD.

5.9.9 Part 90—Additional airworthiness requirements

5.9.9.1 A check of Part 90 additional airworthiness requirements should be carried out to ensure that the proposed modification or repair does not impact on any applicable requirements. If the modification/repair design conflicts with a Part 90 requirement, then it will be necessary to include additional airworthiness standards or special conditions, or alter the proposed modification/repair design so that it is not in conflict with the requirement.

5.9.10 Additional requirements associated with operational approvals

5.9.10.1 A check of the requirements associated with any operational approvals, such as instrument flight rules (IFR) operations, extended diversion time operations (EDTO), approved single engine turbine powered aeroplane (ASETPA) operations or night vision goggle operations, should be carried out to ensure that the proposed modification or repair does not impact on any applicable requirements. If the modification/repair design conflicts with a requirement, then it will be necessary to include additional airworthiness standards or special conditions, alter the proposed modification/repair design so that it is not in conflict with the requirement, or impose operational conditions on the approval.

5.10 Regulation 21.416 – Determination of non-application of airworthiness standards—application to CASA

5.10.1 This regulation only applies to applications that have been made to CASA for approval of a modification/repair design for:

- a. a restricted category aircraft
- b. an aircraft subject to an application for a special certificate of airworthiness in the restricted category under subregulation 21.185(3B).

5.10.2 This regulation provides for CASA to make a determination that a proposed airworthiness standard does not apply for a particular modification/repair design. It provides for a modification/repair design to be subject to similar requirements that apply for type certification of a restricted category aircraft under regulation 21.025.

5.10.3 The process of establishing the applicable airworthiness standards for restricted category and special purpose aircraft is in principle the same as for aircraft with a standard certificate of airworthiness. The requirements of subregulation 21.405(3) for the proposed airworthiness standards are applicable to all type certificated aircraft, including restricted category aircraft.

5.10.4 However, CASA may exclude certain requirements of the airworthiness standards that CASA considers are inappropriate for the special purpose for which the aircraft is to be used. The exclusion of certain requirements may require CASA to specify additional airworthiness standards that provide an acceptable level of safety for the special purpose or conditions limiting the use of the aircraft.

5.10.5 The applicant should include with their application, a certification plan that clearly sets out the following:

- a. the intended special purpose(s)
- b. details of the design
- c. proposed airworthiness standards for the design
- d. the airworthiness standards that they believe are inappropriate for the design
- e. the features or characteristics of the design that are related to those standards
- f. the reasons why those airworthiness standards are inappropriate – the application must demonstrate a clear understanding of the relevant airworthiness standards, their purpose and the hazards addressed
- g. the proposed means of ensuring a level of safety appropriate for the aircraft's intended use, which may include:
 - i. modified requirements of the airworthiness standards
 - ii. additional/alternative airworthiness standards
 - iii. operating limitations.

5.10.6 See AC 21.6 for further information on certification of restricted category aircraft.

5.11 Regulation 21.418 – Determination of non-application of airworthiness standards—application to authorised person or approved design organisation

5.11.1 This regulation only applies to applications that have been made to an ADO or authorised person for approval of a modification/repair design for:

- a. a restricted category aircraft
- b. an aircraft subject to an application for a special certificate of airworthiness in the restricted category under 21.185(3B).

5.11.2 This regulation is similar to regulation 21.416, except that it is for applications that have been made to an ADO or authorised person.

5.11.3 This regulation provides for the ADO or authorised person to make a determination that a proposed airworthiness standard does not apply for a particular modification/repair design. However, the ADO or authorised person must notify CASA of the determination and the determination may not be applied to the design unless CASA provides written notification of agreement with the determination.

5.11.4 The notification to CASA should be made on a DA (see subsection 3.1.6). The ADO or authorised person should include with their notification to CASA, the applicant's certification plan that clearly sets out the following:

- a. the intended special purpose(s)
- b. details of the design
- c. proposed airworthiness standards for the design
- d. the airworthiness standards that they believe are inappropriate for the design
- e. the features or characteristics of the design that are related to those standards
- f. the reasons why those airworthiness standards are inappropriate – the application must demonstrate a clear understanding of the relevant airworthiness standards, their purpose and the hazards addressed
- g. the proposed means of ensuring a level of safety appropriate for the aircraft's intended use, which may include:
 - i. modified requirements of the airworthiness standards
 - ii. additional/alternative airworthiness standards
 - iii. operating limitations
- h. any additional information used by the ADO or authorised person to make the determination.

5.11.5 See regulation 21.216 guidance above and AC 21.6 for further information on certification of restricted category aircraft.

5.12 Regulation 21.420 – Applicants must show compliance with applicable airworthiness standards, submit technical data and provide documents

5.12.1 It is the applicant's responsibility to demonstrate that the design complies with the applicable airworthiness standards. However, the applicant may be assisted by other parties, including the ADO or authorised person to whom the application has been made, with any aspect of the process, including development of the design, the certification plan, carrying out the necessary tests, the compliance summary and obtaining the required approvals.

5.12.2 Technical data

5.12.2.1 It is the applicant's responsibility to provide all the technical data for the design for approval under regulation 21.009. See subsection 5.3 for more information on technical data.

5.12.3 Instructions for continuing airworthiness (ICA)

5.12.3.1 It is the applicant's responsibility to provide the ICA for the modification/repair design. ICA must be prepared in accordance with the airworthiness standard for ICA that applies to the aircraft or aeronautical product (e.g. 23.1529, 25.1529, 27.1529, 29.1529, CS-E 25, FAR 33.4, CS-P 40, FAR 33-4). If a modification/repair design affects the existing ICA (e.g. the modification/repair design alters a part of an aircraft that is subject to a maintenance task in the ICA from the type certificate holder), then a part of showing compliance with the applicable ICA standard will be to assess the effect the modification/repair design has on the existing ICA and, if necessary, provide alternative ICA that will ensure the aircraft or aeronautical product remains airworthy throughout its lifetime. If the assessment shows that the existing ICA are adequate for the modified aircraft or aeronautical product then a statement to that effect should be made under the ICA section of the technical data and modification/repair design approval.

5.12.3.2 The ICA for the modification/repair design should be included in the technical data package for approval under regulation 21.009. See subsection 5.3 for more information on technical data.

Note: A design that changes the airworthiness limitations or certificated life limits of an aircraft or aeronautical product should be classified as major.

5.12.4 Aircraft flight manual (AFM)

5.12.4.1 If a modification/repair design requires the information in the AFM to be changed, then it is the applicant's responsibility to obtain approval of the necessary changes, either as an amendment to the AFM or as an AFM supplement, and provide those approved changes to the person who is to approve the modification/repair design. See subsection 5.2 for more information on approval of changes to an AFM.

5.12.5 Equivalent level of safety information

5.12.5.1 If literal compliance with an applicable airworthiness standard cannot be demonstrated, but compensating factors exist in the design that can be shown to provide a level of safety equivalent to that intended by the standard, then the applicant may request an equivalent level of safety determination under subregulation 21.435(3) or regulation 21.436.

5.12.5.2 The applicant must provide all the necessary data required to make the finding of equivalent safety, including:

- a. an introduction of the background information including an explanation of the need for the equivalent level of safety determination
- b. a listing of the relevant applicable airworthiness standards
- c. a description of the features of the design or other program elements that require the equivalent level of safety finding
- d. a description of compensating design features or alternative methods of compliance which allow the granting of the equivalent level of safety determination (including design changes, limitations or equipment need for equivalency)
- e. an explanation of how design features or alternative methods of compliance provide an equivalent level of safety to the level of safety intended by the standard – the application must demonstrate a clear understanding of the relevant airworthiness standards, their purpose and the hazards addressed.

5.12.6 Certification activity

5.12.6.1 Subregulations 21.420(3), (4) and (5) apply if an application for a modification/repair design approval has been made to CASA and CASA has authorised an ADO to carry out a certification activity in relation to the design.

5.12.6.2 The applicant is taken to have shown CASA that the design complies with the applicable airworthiness requirements if an ADO has carried out a certification activity and has provided CASA with a certificate to the effect that the design complies with the applicable airworthiness requirements.

5.12.6.3 However, the applicant remains responsible for showing compliance in relation to any applicable airworthiness requirements not covered by the certification activity.

5.12.6.4 Furthermore, if CASA is not satisfied that the certificate is complete and accurate then CASA may ask the applicant or the ADO that carried out the certification activity to provide more information. CASA may reject the certificate if the necessary information cannot be provided.¹⁸

5.12.6.5 See AC 21.J-01 for more information on certification activities.

5.13 Regulation 21.425 – Applicants to carry out necessary inspections and tests

5.13.1 The applicant is responsible for carrying out all inspections and tests necessary to show that the design complies with the applicable airworthiness standards for the design. However, the applicant may enlist the assistance of other parties, such as an ADO, authorised person, maintenance organisation or production organisation, as necessary, to ensure the inspections and tests are carried out to the required standards.

5.13.2 Test results from, but not limited to, component, ground, and flight testing, may be required. If flight testing is necessary for the purposes of research and development or showing compliance with the applicable airworthiness standards then those flights should be carried out under an experimental certificate.¹⁹

¹⁸ See Subparts 11.B and 11.BA.

¹⁹ See AC 21-10 for more information on experimental certificates.

5.13.3 Testing must be consistent with that required by the applicable airworthiness standards.

5.13.4 The test plans and test reports (if required) must be documented and approved under regulation 21.009 as part of the technical data for the design (see subsection 5.3 and AC 21-23 for more information on technical data).

5.13.5 Prototype parts that are to be tested must comply with the technical data that is relevant to the test. Where consistent with the applicable airworthiness standards, the test plan that is approved as part of the technical data may include specific data (i.e. specifications, drawings, manufacturing processes) for test articles that are representative of the 'as installed' configuration. The test articles must be sufficiently representative to ensure the test data is valid and sufficient to demonstrate that the design meets the applicable airworthiness standards.

5.13.6 If the test parts are not to be used in service then it is not necessary for them to be made by an AMO or a production organisation, provided the applicant can demonstrate that they comply with the relevant technical data.

5.13.7 If tests or inspections are considered necessary to show compliance then the applicant should submit the compliance and test plans to the person who is to approve the technical data and the modification/repair design in advance of carrying out the tests or inspections. This allows the person to provide advice in relation to the tests and inspections that may be required and for the person to observe those tests or inspections necessary to provide the approvals. It should also avoid any tests or inspections having to be repeated for the purposes of regulation 21.430.

5.14 Regulation 21.430 – CASA, authorised person or approved design organisation may carry out or observe certain tests

5.14.1 The person to whom the application for approval of the modification/repair design has been made (i.e. CASA, ADO or authorised person), may require the applicant to allow them to carry out or observe any inspection or test that is necessary to satisfy them that the design complies with the applicable airworthiness standards. The applicant must be notified in writing.

5.14.2 If flight testing is required under this regulation for the purposes of research and development or showing compliance with the applicable airworthiness standards then the applicant is responsible for obtaining an experimental certificate for the flight.²⁰

5.14.3 See subsection 5.13 for further information on inspections and tests.

5.15 Regulation 21.435 – Grant of modification/repair design approvals—grant by CASA

5.15.1 Regulation 21.435 provides for CASA to grant a modification/repair design approval.

5.15.2 Granting approval

5.15.2.1 CASA must grant the approval if CASA is satisfied that the applicant has shown, via the technical data for the design, that:

- a. the design complies with the applicable airworthiness standards for the design, which also includes:
 - i. inspections and tests under regulation 21.425 and 21.430

²⁰ See AC 21-10 for more information on experimental certificates.

- ii. the ICA for the design
- iii. any AFM amendments or supplements; and
- b. no feature or characteristic of the design makes the relevant aircraft, aircraft engine, propeller or appliance unsafe for its intended use. See subsection 3.3 for more information on unsafe feature or characteristic analysis.

5.15.3 Conditions

5.15.3.1 Under regulations 11.055 and 11.056, CASA may make the approval subject to any condition that is necessary in the interests of the safety of air navigation. For example, operational limitations, or if the technical data for the design is only sufficient to satisfy CASA that the design will comply with the applicable airworthiness standards for a limited period then CASA may specify a limit at which the approval ceases.

5.15.3.2 If the condition was not sought by the applicant then CASA must provide the applicant the reasons for the decision.²¹

5.15.4 Certification activity

5.15.4.1 Subregulation 21.435(2A) applies if an ADO has carried out a certification activity for a modification/repair design. See subsection 5.12.6 and AC 21.J-01 for more information on certification activities.

5.15.5 Equivalent level of safety determination

5.15.5.1 Paragraph 21.435(3)(c) provides for CASA to make an equivalent level of safety determination in cases where the application for the modification/repair design approval was made to CASA (see regulation 21.436 for cases where the application was made to an ADO or authorised person). If an equivalent level of safety determination is sought by the applicant, the applicant must provide all the necessary information for CASA to make the determination. See subsection 5.12.5 for the information required for an equivalent level of safety determination.

5.15.6 Refusal to grant approval

5.15.6.1 If CASA decides to refuse to grant the modification/repair design approval then CASA must provide the applicant with the reasons for the decision.²²

5.16 Regulation 21.436 – Application to authorised person or approved design organisation—non-compliance with applicable airworthiness standards: determination of equivalent level of safety

5.16.1 Regulation 21.436 provides for an equivalent level of safety determination to be made when the application for the modification/repair design approval was made to an ADO or an authorised person (see regulation 21.435 for cases where the application was made to CASA).

5.16.2 An ADO or authorised person must be specifically approved to make an equivalent level of safety determination – an authorisation to approve modification/repair designs under regulation 21.437 does not imply an approval to make an equivalent level of safety determination.

²¹ See regulation 11.060.

²² See regulation 11.060.

5.16.3 Equivalent level of safety determination by CASA

5.16.3.1 If the ADO or authorised person has not been approved to make equivalent level of safety determinations then they must apply to CASA for the determination via a DA (see subsection 3.1 for more information about a DA). The ADO or authorised person must provide CASA the following:

- a. the relevant technical data for the design; and
- b. the information mentioned in paragraph 5.12.5.2.

5.16.3.2 See subsection 5.12.5 for the information required for an equivalent level of safety determination.

5.16.4 Equivalent level of safety determination by an ADO or authorised person

5.16.4.1 If the ADO or authorised person has been approved to make equivalent level of safety determinations then they may make a determination; however, the determination must be agreed by CASA in writing before it may be applied. If an ADO or authorised person has made an equivalent level of safety determination then they must provide CASA, in the form of a DA (see subsection 3.1 for more information about a DA), a notice in relation to the determination that includes the following:

- a. a statement that:
 - i. the design does not comply with the standard; and
 - ii. the non-compliance is compensated for by factors that provide an equivalent level of safety; and
- b. details of how the non-compliance is compensated for, including:
 - i. the relevant technical data for the design; and
 - ii. the information mentioned in paragraph 5.12.5.2.

5.16.4.2 If CASA agrees with the notice and the equivalent level of safety determination is applied to the modification/repair design, then the notice to CASA from the ADO must be retained with the documents for the modification/repair design approval.

5.17 Regulation 21.437 – Grant of modification/repair design approvals — grant by authorised person

5.17.1 Regulation 21.437 provides for an ADO or an authorised person to grant a modification/repair design approval.

5.17.2 Granting approval

5.17.2.1 The ADO or authorised person must grant the approval if they are satisfied that the applicant has shown, via the technical data for the design, that:

- a. the design complies with the applicable airworthiness standards for the design, which includes:
 - i. any determinations under regulations 21.414, 21.416 or 21.418 in relation to the applicable airworthiness standards for the design
 - ii. inspections and tests under regulation 21.425 and 21.430
 - iii. the ICA for the design
 - iv. any AFM amendments or supplements; and

- b. no feature or characteristic of the design makes the relevant aircraft, aircraft engine, propeller or appliance unsafe for its intended use. See subsection 3.3 for more information on unsafe feature or characteristic analysis.

5.17.3 Technical data

5.17.3.1 The technical data for the design must be approved under regulation 21.009.

5.17.3.2 The ADO or authorised person that will approve the modification/repair design must ensure that the technical data package covers all the relevant requirements and has the necessary approvals. This should be clearly shown in the compliance summary.

5.17.3.3 See subsection 5.3 for more information on technical data.

5.17.4 Equivalent level of safety determination

5.17.4.1 If the ADO or authorised person is not satisfied that the design complies with an applicable airworthiness standard then an equivalent level of safety determination under regulation 21.436 may be applied.

5.17.5 Conditions

5.17.5.1 Under regulations 11.055 and 11.056, the ADO or authorised person may make the approval subject to any condition that is necessary in the interests of the safety of air navigation. For example, operational limitations, or if the technical data for the design is only sufficient to satisfy the ADO or authorised person that the design will comply with the applicable airworthiness standards for a limited period then the ADO or authorised person may specify a limit at which the approval ceases.

5.17.5.2 If the condition was not sought by the applicant then the ADO or authorised person must provide the applicant the reasons for the decision.²³

5.17.6 Coordinated approvals

5.17.6.1 If an ADO or authorised person (the first ADO/AP) receives an application for a modification/repair design approval that requires coordination of multiple specialities, some of which are not covered under the first ADO/AP's scope of approval, then the parts of the activity that are not covered under the first ADO/AP's approval certificate must be carried out by another ADO or authorised person (the second ADO/AP) whose scope of approval includes the relevant specialities.

5.17.6.2 A coordinated approval must be clearly documented in the certification plan, including:

- a. the agreed responsibilities of each ADO or authorised person for each applicable requirement
- b. the communication plan, describing communication and coordination responsibilities between the ADOs or authorised persons
- c. the project schedule, including major milestones and deliverables.

5.17.6.3 The first ADO/AP issues the final approval under regulation 21.437 based on the complete technical data for the design, which must be approved under regulation 21.009 by the first ADO/AP and the second ADO/AP in accordance with the agreed compliance plan.

²³ See regulation 11.060.

5.17.6.4 The second ADO/AP carries out its technical data approvals under its own approval certificate or instrument of appointment. This technical data must cover and clearly document:

- a. the scope of the design activities carried out by the second ADO/AP
- b. all the applicable airworthiness standards that are applicable to the relevant approvals
- c. any findings of compliance that are partial or incomplete in relation to the final approval
- d. any interface issues that must be considered by the first ADO/AP for granting the final approval
- e. any conditions, limitations or restrictions necessary for the design.

5.17.7 Refusal to grant approval

5.17.7.1 If the ADO or authorised person decides to refuse to grant the modification/repair design approval then they must provide the applicant with the reasons for the decision.²⁴

5.18 Regulation 21.440 – Form of modification/repair design approvals

5.18.1 A modification/repair design approval must be issued in writing (including electronic form) and must contain at least the following information:

- a. The name of the person to whom it is granted. This must be the name of the holder of the modification/repair design approval. It may be an individual or a body corporate. It is recommended to include contact details as well.
- b. Describe or otherwise identify the modification or repair. This must include a reference to the technical data for the design, including any ICA and AFM amendments, and must contain sufficient detailed information to allow the modification or repair to be carried out on the aircraft or aeronautical product.
- c. Specify, by reference to manufacturer, model and serial number, each aircraft, aircraft engine, propeller or appliance to which the design of the modification or repair relates.
 - i. If an approval is for more than one aircraft or aeronautical product then the approval need not state each particular registration or serial number individually, but must include a statement that enables accurate identification of the aircraft, aircraft engines, propellers or appliances to which the approval applies (e.g. an approval may specify the applicable types and models of aircraft, aircraft engines or propellers or the part numbers of the applicable appliances, and the range(s) of applicable serial numbers).
 - ii. For approvals that apply to aircraft engines, propellers or appliances and for which compliance with the applicable airworthiness standards can be shown for all serial numbers of a particular part number, an approval may specify the part number and use the statement 'all serial numbers'. Such approvals are primarily applicable in component workshop applications, such as approval of a

²⁴ See regulation 11.060.

generic minor repair or approval of an alternative material (e.g. if a particular material specified in a component maintenance manual is no longer available then an alternative material may be approved). The following must also be applied for such approvals:

- A. the approval must be limited to the particular part number(s) for which compliance with the applicable airworthiness standards can be established; and
 - B. the airworthiness compliance assessment must take into account all aircraft types and models for which the aircraft engine, propeller or appliance is included in the type design, and must establish that in all cases the modification/repair design complies with the applicable airworthiness standards and no feature or characteristic of the design makes the relevant aircraft, aircraft engine, propeller or appliance unsafe for its intended use.
- d. The date on which the approval was granted. This is the date that the approval comes into effect, unless otherwise stated on the approval – the approval may state a different date on which the approval comes into effect; however, the date must not be before the approval was granted.²⁵
 - e. If applicable, the limit at which the approval ceases. This may be specified in any appropriate manner (e.g. calendar time, flight time, flight cycles).
 - f. Any conditions associated with the approval.
 - g. The name of the person granting the approval. If the approval is granted by an ADO then the name of the individual granting the approval on behalf of the ADO must also be included.
 - h. The regulation under which the approval is granted:
 - i. if the approval is granted by CASA – regulation 21.435
 - ii. if the approval is granted by an ADO or authorised person – regulation 21.437.

²⁵ See regulations 11.060 and 11.065.

5.19 Regulation 21.445 – Variation of modification/repair design approvals

5.19.1 The same requirements apply for a variation of a modification/repair design approval as for a modification/repair design approval, except that it is not necessary for the applicant to resubmit the technical data that CASA, the ADO or authorised person (as applicable) already holds. In particular:

- a. the holder must apply for a variation, carry out any necessary inspections and tests and provide all the new or varied technical data in accordance with the relevant provisions of Subpart 21.M
- b. the technical data for the variation must be approved under regulation 21.009
- c. the variation of the modification/repair design approval must be approved under:
 - i. regulation 21.435 – by CASA
 - ii. regulation 21.437 – by an ADO or authorised person.

Note: Under regulation 11.067, CASA, the ADO or authorised person who granted a modification/repair design approval may impose or vary a condition of a previously approved modification/repair design if necessary in the interests of aviation safety. In that case an application is not required; however, any technical data for the variation must still be approved, and the holder of the modification/repair design approval must be given the reasons for the variation.

5.20 Regulation 21.450 – Transfer of modification/repair design approvals and approvals granted in accordance with alternative method

5.20.1 The holder of a modification/repair design approval or an approval granted in accordance with a method specified in a legislative instrument issued under regulation 21.475 may transfer the approval to another person, with the written agreement of the other person.

5.20.2 If an approval is transferred to another person then a copy of the records required to be kept under regulation 21.455 must be provided to the new holder. The new holder becomes responsible for the records.

5.20.3 The new holder also becomes responsible for all the other ongoing obligations associated with the approval, including defect reporting under regulation 21.003 and providing up to date ICA and AFM amendments under regulation 21.460.

5.20.4 This regulation does not apply to other kinds of design approvals, such as foreign design approvals that are taken to be approved under regulation 21.470.

5.21 Regulation 21.455 – Record keeping and making records available to CASA

5.21.1 The holder of a modification/repair design approval or an approval granted in accordance with a method specified in a legislative instrument issued under regulation 21.475 must keep the documents and records for the approval for at least 12 months after the approval ceases to be in force. This includes:

- a. the approval document
- b. all the technical data for the design, including:
 - i. test and inspection reports
 - ii. ICA
 - iii. AFM amendments or supplements
- c. any determinations made in relation to the applicable airworthiness standards under regulations 21.414, 21.416 21.418 or 21.436.

5.21.2 If the approval is transferred to another person then a copy of the records required to be kept under this regulation must also be provided to the new holder.²⁶ The new holder becomes responsible for the records.

5.21.3 CASA may require, by written notice, that the holder of an approval make the documents and records available for inspection by CASA.

5.21.4 The requirements to retain the records and provide them to CASA continue to apply if an approval is suspended.

5.22 Regulation 21.460 – Instructions for continued airworthiness and flight manual supplement to be made available

5.22.1 The holder of a modification/repair design approval or an approval granted in accordance with a method specified in a legislative instrument issued under regulation 21.475 is required to provide the current version of any ICA and AFM amendments or supplement for the design to any person who is required to comply with them, such as the registered operator of the aircraft that has installed the approved design. The documents may be in electronic form.

5.22.2 The ICA is approved as part of the modification/repair design approval; therefore, if a variation of the existing ICA or new ICA is necessary then it must be approved as a variation of the modification/repair design approval. This includes approval of the varied or new ICA as technical data under 21.009, and approval of the variation of the modification/repair design approval under regulation 21.435 or 21.437. See regulation 21.445 for more information about variations of modification/repair design approvals.

²⁶ See regulation 21.450.

5.23 Regulation 21.470 – Foreign modification/repair designs

5.23.1 This regulation provides for automatic acceptance of certain foreign modification/repair designs. Such an approval must clearly identify the applicable aircraft, aircraft engine(s), propeller(s) or appliance(s) – this regulation does not include guidance or advisory material that only provides generally applicable instructions on how to carry out maintenance.

5.23.2 An approval that is taken to have been approved under this regulation does not need further approval under Subpart 21.M. It is the responsibility of the registered operator of the aircraft and the person who carries out the modification/repair to ensure that the approval meets the requirements of the regulations.

5.23.3 Paragraph 21.470(a) – Approval by the NAA of a recognised country

5.23.3.1 Recognised countries are defined in regulation 21.012. Under regulation 21.012A, any modification/repair design approval issued by the European Aviation Safety Agency (EASA) is taken to have been issued by the NAA of a recognised country.

5.23.3.2 Approved by the NAA of a recognised country means approved on behalf of the NAA by an officer or a delegate of the NAA. It does not include an approval granted by an individual or organisation that has been authorised to approve designs on their own behalf by the NAA of a recognised country.

5.23.3.3 For the purposes of paragraph 21.470(a), the NAA need not be the NAA of the TC holder or State of Design of the aircraft or aeronautical product.

5.23.4 Paragraph 21.470(b) – TC holder – system approved by the NAA of a recognised country

5.23.4.1 Published or issued by the foreign TC holder of the aircraft, aircraft engine or propeller under a system approved by the NAA of that (recognised) country means approved by, or on behalf of, the individual or organisation that the NAA of the recognised country recognises as the holder of the applicable TC. The document issued by the TC holder should have an approval statement that shows that the modification/repair design has the necessary approval (i.e. approved under the regulations of the relevant recognised country or the NAA).

5.23.4.2 A design for an appliance for an aircraft, aircraft engine, or propeller may also be covered by this provision, including a design issued by a subcontractor or supplier to a TC holder that is referenced in a design issued by the TC holder (e.g. a service bulletin (SB) for an aeronautical product that is specified in an aircraft SB).

5.23.4.3 If the document issued by the TC holder states or makes clear that no regulatory approval has been given then the modification/repair design is not taken to be approved. However, the data may be used, as appropriate, to substantiate an approval under regulation 21.437.

5.23.5 Paragraph 21.470(c) – Appliance – system approved by the NAA of a recognised country

5.23.5.1 This provision only applies to an appliance designed in a recognised country. However, for the purposes of this regulation, designed in a recognised country includes an appliance that was designed under a system approved by the NAA of a recognised country (e.g. the design was approved in conjunction with a type certification program of a recognised country), regardless of the physical location of the various facilities associated with the manufacturer of the appliance.

5.23.5.2 The NAA that approved the system of approval for the modification/repair design and the NAA of the country in which the appliance was designed must be the same.

5.23.5.3 The document issued by the manufacturer should have an approval statement that shows that the modification/repair design has the necessary approval (i.e. approved under the regulations of the relevant recognised country or the NAA).

5.23.5.4 If the document issued by the manufacturer states or makes clear that no regulatory approval has been given then the modification/repair design cannot be taken to be approved under this provision. However, the data may be used, as appropriate, to substantiate an approval under regulation 21.437.

5.23.5.5 See paragraph 5.23.4.2 for designs referenced in a modification/repair design issued by a TC holder.

5.23.6 Paragraph 21.470(d) – Accepted under an agreement between CASA and foreign NAA

5.23.6.1 CASA and the Australian Government may make agreements with other NAAs or countries that recognise certain kinds of approvals. This includes countries that are not on the list of recognised countries.

5.23.6.2 If an arrangement provides for acceptance of modification/repair design approvals, which may include approvals granted by the NAA and approvals granted by other individuals or organisations authorised by the NAA, then those approvals are taken to be approved, subject to any conditions mentioned in the arrangement.

5.23.6.3 These arrangements are published on the CASA website.

5.24 Regulation 21.475 – CASA may issue instruments specifying alternative methods of approval of modifications and repairs

5.24.1 This regulation provides for CASA to approve a method of approval for a modification or repair to an aircraft, aircraft engine, propeller or appliance that may be used as an alternative to approval under the other provisions of Subpart 21.M.

5.24.2 Such an approval must be issued as a legislative instrument, and therefore must be registered on the federal register of legislative instruments and will be published on the CASA or FRLI/ComLaw website.

Executive Manager
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