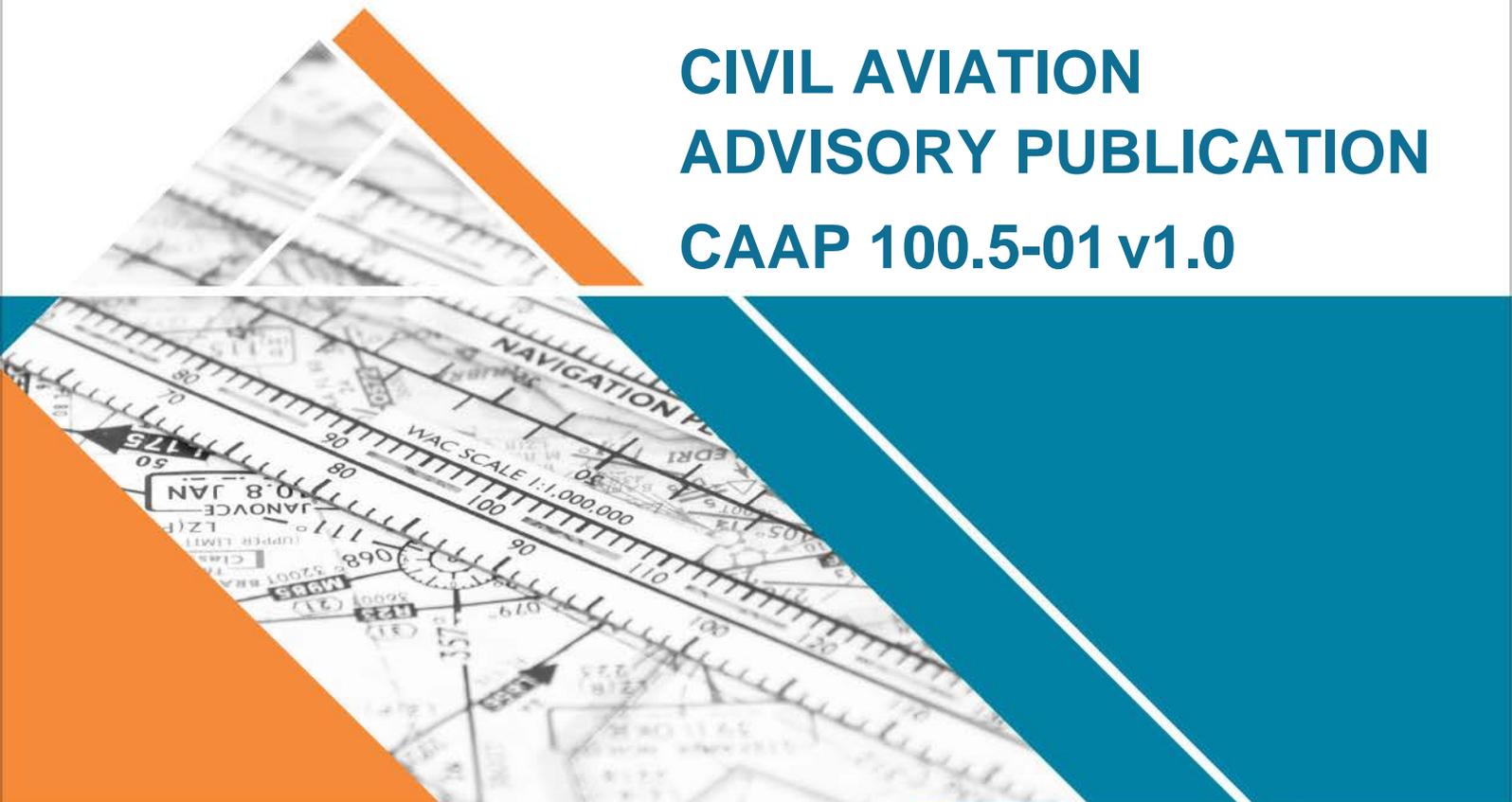




Australian Government
Civil Aviation Safety Authority

CIVIL AVIATION ADVISORY PUBLICATION CAAP 100.5-01 v1.0



Maintenance of aircraft - general requirements



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This Civil Aviation Advisory Publication (CAAP) provides guidance, interpretation and explanation on complying with the *Civil Aviation Regulations 1988 (CAR)* or a Civil Aviation Order (CAO).

This CAAP provides advisory information to the aviation industry in support of a particular CAR or CAO. Ordinarily, the CAAP will provide additional 'how to' information not found in the source CAR, or elsewhere.

Civil Aviation Advisory Publications should always be read in conjunction with the relevant regulations/orders.

Audience

This CAAP applies to any person who is responsible for the management of continuing airworthiness or maintenance of aircraft where Part 42 of the *Civil Aviation Safety Regulations 1998 (CASR)* does not apply and includes:

- certificate of approval (COA) holders carrying out maintenance of aircraft and aircraft components
- Part 66 licence holders carrying out maintenance on aircraft
- registered operators and owners of aircraft.

Purpose

The purpose of this CAAP is to provide guidance for maintainers, owners and operators of aircraft that are subject to the requirements set out in CAO 100.5.

This CAAP is intended to:

- assist readers to find the relevant maintenance information applicable to their intended operations
- provide policy clarification where interpretational difficulties have been previously identified by users.

For further information

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

Status

This version of the CAAP is approved by the Manager, Airworthiness and Engineering Standards Branch.

Version	Date	Details
v1.0	December 2018	Initial version.

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1 Reference material

1.1 Acronyms

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

Acronym	Description
AD	airworthiness directive
ADF	automatic direction finder
APF	Australian Parachute Federation
AWB	Airworthiness bulletin
AWL	airworthiness limitation
CAAP	Civil Aviation Advisory Publication
CAR	<i>Civil Aviation Regulations 1988</i>
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
CAO	Civil Aviation Order
CMR	certification maintenance requirement
COA	certificate of approval
COR	certificate of registration
GARD	general aviation recovery devices
GNSS	global navigation satellite system
LAME	licensed aircraft maintenance engineer
MR	maintenance release
MSG-3	maintenance steering group -3
NAA	National Aviation Authority
PPE	personal protection equipment
MSDS	material safety data sheet
SOM	system of maintenance
STC	supplementary type certificate
TC	type certificate
VHF	very high frequency
VOR	VHF omni-directional radio range (OMNI)

1.2 References

Regulations

Regulations are available on the Federal Register of Legislation <https://www.legislation.gov.au/>

Document	Title
Part 4A of CAR	Maintenance
Part 66 of CASR	Continuing airworthiness - aircraft engineer licences and ratings Part 66 Manual of Standards
Civil Aviation Order (CAO) 100.5	General requirements in respect of maintenance of Australian aircraft

Advisory material

Document	Title
FAA ¹ AC 43.13-1B	Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair

1.3 Forms

CASA's forms are available at <http://www.casa.gov.au/forms>

Form number	Title
Form 918	Maintenance release (included flight and technical records)
Form 924	Aircraft maintenance certification log (order printed form)
Form 928	Recurring maintenance control (order printed form)
Form 958	Log book statement part 2 (order printed form)
Form DA 741	Superseded maintenance release form

¹ United States of America Federal Aviation Administration.

2 Overview

- 2.1.1 Civil Aviation Order (CAO) 100.5 contains the general maintenance requirements for aircraft where Part 42 of the *Civil Aviation Safety Regulations 1998 (CASR)* does not apply. It is intended to be read in conjunction with Part 4A of *Civil Aviation Regulations 1988 (CAR)*, and applicable aircraft manufacturers' maintenance instructions.
- 2.1.2 In a previous amendment² CASA incorporated additional maintenance requirements that were previously set out in airworthiness directives (ADs) with the aim of removing obsolete ADs and consolidating all relevant maintenance requirements that flow out of Part 4A of the CAR into one document.
- 2.1.3 The following changes have been made to CAO 100.5 in the latest (2018) amendment:
- amended the definition of 'covered by a maintenance schedule'
 - amended retention requirements for maintenance records
 - introduced a provision for using computerised maintenance tracking print-outs for the purpose of listing required maintenance on a maintenance release (MR)
 - provide for some flexibility in for the specified duration between required maintenance actions
 - directions for use of a CASA MR in the form of a direction given under regulation 43 of CAR have been added to Appendix 3
 - added a provision for CASA to issue maintenance authorisations for maintenance of composite aircraft structures under subregulation 42ZC(6) of CAR
 - deleted redundant Table 1, which contained a list of specified composite structure aircraft
 - clarified requirements for maintainers of airframe parachute systems used in general aviation recovery devices
 - specified that life limitations issued by manufacturers of turbine engines (stated as either maintenance manual amendments or service bulletins) are to be treated as mandatory instructions
 - clarified that an aircraft engaged in flying training must be maintained as if it were an aerial work aircraft
 - clarified that certain database updating activities, such as updating a map database in a global navigation satellite system (GNSS) system, are not regarded as maintenance of aircraft
 - clarified that CAO 100.5 does not over-ride approved systems of maintenance
 - specified that guidance material issued by CASA in the form of a CAAP or airworthiness bulletin (AWB) may be treated as approved data (subject to conditions)
 - removed the requirement to perform regular calibration checks on fuel quantity indication systems that are not float actuated or that have a self-test function which verifies that the system is functioning within manufacturers stated tolerances
 - removed the requirement to perform routine testing of emergency exits
 - amended instructions for maintenance of towing release systems
 - specified standards for replenishing of aircraft oxygen systems
 - amended instructions for testing fire protection systems in toilet areas

² (*Civil Aviation Order 100.5 Amendment instrument 2015 (No 1)*)

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- removed requirements to test automatic direction finder (ADF) and very high frequency (VHF) omnidirectional radio range (OMNI) (VOR) systems in aircraft not engaged in instrument flight rules flight
- removed requirements to carry out maintenance on combustion type aircraft cabin heaters. This topic is now adequately addressed by the relevant manufacturers' data and state of design ADs
- removed certain requirements relating to maintenance of aircraft engaged in approved single-engine turbine aeroplane operations.

3 Maintenance schedules and systems of maintenance

3.1 Status

- 3.1.1 Other than those specified in clauses 16 and 17, additional maintenance requirements set out in Appendix 1 of CAO 100.5 do not apply to an aircraft if the aircraft is covered by a maintenance schedule (schedule) or system of maintenance (SOM) and they make provision for the requirements contained in the Appendix.

3.2 Application clarification

- 3.2.1 Where a discrepancy exists between the requirements in CAO 100.5 and the instructions in an aircraft's schedule or SOM, the schedule or SOM will prevail.
- 3.2.2 If the schedule or SOM is silent on a maintenance requirement that is called for in Appendix 1 of CAO 100.5, then the requirement in the CAO will apply.

3.3 Retention of maintenance records

- 3.3.1 For purposes of clarity and to avoid doubt, copies of documents referred to in an aircraft's log book, such as details of a maintenance organisation's work package, are not required to be retained by the certificate of registration (COR) holder unless sections of the work package are provided for the purpose of meeting the final certification requirements set out in Part 4 of Schedule 6 of CAR.
- 3.3.2 If a certificate of approval (COA) holder provides a work package or sections of a work package as part of a maintenance record, the COR holder must retain the records for the period of 1 year after the aircraft's operating life has ended or the aircraft has been permanently removed from the Register of Australian Aircraft.³
- 3.3.3 If a COA holder carries out a modification, then subparagraph 5.2 (e) of CAO 100.5 requires that copies of the approved modification data must be given to the COR holder and retained for the life of the aircraft's maintenance records. This requirement does not apply if the data is on public record or otherwise publicly available. For example, if design data is provided in an AD and fully describes the modification or repair, a copy of that data is not required to be retained with the aircraft's maintenance records.

3.3.4 Retention of documents by a certificate of approval holder

- 3.3.4.1 Maintenance records created by a COA holder, such as work recording sheets and internal certification records that are used during an inspection or repair of an aircraft, are required under section 5A of CAO 100.5 to be retained by the COA holder for a period of two years after the final certification has been made for the maintenance.

³ In accordance with Section 5 of CAO 100.5.

4 Instructions for use of a maintenance release

4.1 Class A aircraft

- 4.1.1 Section 6 of CAO 100.5 allows for the use of computer printouts that have been generated by a computerised maintenance tracking and management system. The print-outs may be attached to a MR. This will satisfy the requirement to record all forecast maintenance requirements in the 'Maintenance Required' section of a MR document. The print-out must be securely fixed to the MR and it should be marked with the identification number of the MR to which it is attached.⁴
- 4.1.2 If an operator of a Class A aircraft has a system comprising an approved maintenance control manual that includes a procedure for tracking and recording time-in-service and required maintenance, then that system, whether it is a paper or electronically managed system, is approved for the purpose of subparagraphs 6.5 (d), (e) and (f) of CAO 100.5.

4.2 Class B aircraft

- 4.2.1 The COR holder of a Class B aircraft may use the CASA MR, or an alternative form approved by CASA.
- 4.2.2 If using the CASA MR document, the operator and all persons who are involved in issuing the MR, making an endorsement, clearing an endorsement or making a record on the MR must comply with the instructions for its use in Appendix 3 of CAO 100.5. A summary of those instructions is provided inside the front cover of the CASA Form 918 maintenance release book for use as a quick reference.
- 4.2.3 The instructions in Appendix 3 of CAO 100.5 also apply to the superseded MR form DA 741. Maintainers may continue to use until their existing stocks of the form until they are exhausted.

4.2.4 Additional considerations

- 4.2.4.1 As a result of the recent changes to CAO 100.5, the operator should consider the following:
- For the purpose of listing maintenance that may be required during the period of validity of the MR, a print-out generated by a computerised maintenance tracking and management system may be fixed to Part 1 of the MR. If the print-out does not cover the full calendar period of the MR then it must be updated in a timely manner so that, at all times, a pilot can determine whether maintenance is due before commencing a flight or will become due during a flight.
 - If sequential print-outs are used during the life of the MR, it is not necessary to retain the earlier versions of the printouts with the MR.

4.2.5 Supplementary pages

- For the purpose of extending Parts 1, 2 and 3 of the MR, supplementary pages may be fixed to the MR.

⁴ In accordance with paragraph 6.6 of CAO 100.5.

- The supplementary pages may be in the form of a photocopy of a blank table or a page that has been ruled up to match the columns of the appropriate section and includes the relevant headings.
- If supplementary pages are to be used:
 - o a notation is required to be made at the bottom of each extended Part and each supplementary page of that Part stating that a supplementary page is attached
 - o each supplementary page is required to be identified with the unique serial number for the MR mentioned in Part 1 of the MR
 - o each supplementary page is required to be securely attached to the MR.

Note: Sample supplementary pages at Annexes A, B and C to this CAAP may be copied for use with a MR.

5 Maintenance authorisations

5.1 Composite aircraft structures

- 5.1.1 The Part 66 Manual of Standards states that a holder of a category B1 licence may inspect composite aircraft for the purpose of issuing a MR or complying with an AD provided that the inspection does not require the use of specialised equipment or training.⁵ The carrying-out of repairs to composite structures is not a privilege of a B1 licence unless the licence holder is also a specially qualified person as defined in paragraph 7A.1 of CAO 100.5.
- 5.1.2 Composite maintenance is defined in paragraph 7.A.1 of CAO 100.5 as maintenance of the composite structures of a composite structure aircraft. This does not include non-structural composite components of an airframe such as fairings, fillets and wingtips.
- 5.1.3 CASA has made provision for a person to be issued with a composite maintenance authorisation under subregulation 42ZC (6) of CAR. Appendix A provides guidance for in-house training that can be provided by a COA holder for the purpose of qualifying a licensed aircraft maintenance engineer (LAME) for issue of a composite maintenance authorisation by CASA.
- 5.1.4 A composite maintenance authorisation under subregulation 42ZC(6) of CAR may be issued by CASA if an applicant has completed the training program set out at Appendix A of this CAAP and provides evidence of having carried out 6 months' of supervised composite maintenance.
- 5.1.5 The training provisions set out in this CAAP do not include hot bonding repairs. Authorisations issued on the basis of training delivered under these provisions will be limited to cold bonding repairs.

Note: CAO 104.0 provides for a COA holder who holds a delegation under subregulation 42ZC(6) to issue a certification authorisation for the purpose of composite maintenance.

5.2 General aviation recovery devices

- 5.2.1 General aviation recovery devices (GARD) are made up of an airframe parachute and a deployment system, each of which require special qualifications to be held by a person carrying out maintenance on them.
- 5.2.2 CAO 100.5 specifies that maintenance of GARD equipment including the airframe parachute may only be provided by a Part 145 organisation or a CAR 30 organisation.
- 5.2.3 Maintenance of parachute deployment devices and associated control systems may only be carried out by a specially qualified LAME.⁶

⁵ May be incorporated by sub-sub-subparagraphs 66.A.20 (a) 4. (ii) (F), (G) and (H) of the *Part 66 Manual of Standards Amendment Instrument 2016 (No. 5)*.

⁶ In accordance with paragraph 8A.1 of CAO 100.5.

5.3 Airframe parachutes

- 5.3.1 The airframe parachute may only be inspected or packed by a person holding a valid qualification as a parachute Packer B or Parachute Rigger issued by the Australian Parachute Federation (APF) or an equivalent qualification approved by CASA.
- 5.3.2 Repairs to an airframe parachute may only be carried out by a person holding a valid qualification as a Parachute Rigger issued by the APF or an equivalent qualification approved by CASA.⁷ A qualified parachute packer or rigger is not required to hold a Part 66 licence to perform the maintenance and may certify for the maintenance using their qualification number.
- 5.3.3 If a holder of a category B1 licence wishes to obtain a Packer B or Rigger qualification, the APF has advised CASA that on receipt of an application and payment, the APF will make a position available for the LAME on the next available course.

⁷ In accordance with subparagraph 8A.3 (b) (iii) of CAO 100.5.

6 Maintenance requirements, data and exclusions

6.1 Requirements

6.1.1 Compliance with airworthiness limitations and certification maintenance requirements

- 6.1.2 A COR holder for an aircraft is required to comply with maintenance requirements that have been identified as either certification maintenance requirements (CMRs) or airworthiness limitations (AWLs).
- 6.1.3 CMRs and /or AWLs are maintenance requirements that have been approved by the state of design National Aviation Authority (NAA) as part of the design approval of an aircraft, engine, propeller or component.

6.2 Data

6.2.1 Information published by foreign countries and CASA

- 6.2.1.1 The NAA of a number of foreign countries have published useful information for the guidance of aircraft maintainers. The information is intended to supplement that which is provided by manufacturers of aircraft and aircraft components, but is not to be used if the information contradicts a manufacturer's instructions. For example, the Federal Aviation Administration (FAA) AC 43.13-1B, is approved in section 9 of CAO 100.5 for use as maintenance data for the purpose of paragraph 2A (2) (e) of CAR provided that:
- maintenance data mentioned in paragraphs 2A (2) (a) to (d) of CAR are inadequate for the purpose
 - the information described above is appropriate to the work being carried out and is not inconsistent with any higher-level maintenance data that may be applicable. Higher level maintenance data includes manufacturer's data or data mentioned in paragraphs 2A (2) (a) to (d) of CAR.
- 6.2.1.2 The list of approved data in subsection 14 of CAO 100.5 has been expanded in the latest amendment to include guidance material that is published by:
- CASA
 - the European Aviation Safety Authority
 - or
 - the NAA of a recognised country.⁸
- 6.2.1.3 Information published by a CASA recognised NAA in the form of ACs, bulletins, directions, advisory publications or any other format may be used.
- 6.2.1.4 Approved maintenance data, within the context of regulation 2A of CAR, is data that describes how a maintenance task is to be carried out. CAR 2A approved data is neither an approval to carry out a modification or a repair, nor a requirement to carry out an inspection, repair or modification. Approved maintenance data should be read in conjunction with any applicable maintenance instruction such as in an inspection

⁸ Countries listed in regulation 21.010B of CASR.

schedule, or a modification approval issued under subpart 21.M of CASR, an airworthiness directive, or an STC.

6.3 Exclusions

6.3.1 Global navigation satellite system

- 6.3.1.1 A global navigation satellite system (GNSS) database and its upkeep is an operational responsibility of the COR holder.
- 6.3.1.2 CASA does not regard the upkeep of a GNSS maps database as a maintenance function provided that no special tooling is required and the updating does not require dismantling of the navigational device or removal of aircraft panels for access purposes.
- 6.3.1.3 GNSS databases are normally updated by insertion of a removable memory device and in some cases are carried out automatically via wireless link. It is the responsibility of the person carrying out the update to ensure that the COR holder or operator has authorised the update. It is the responsibility of the COR holder or operator to ensure that the person performing the update is familiar with the process and competent to perform it.

6.3.2 Fuel calibration checks

- 6.3.2.1 The requirement in Clause 6 of Appendix 1 of CAO 100.5 has been amended to exclude aircraft that do not rely on float type fuel gauge systems or that have built-in self-test functions. This means that it is no longer a requirement to carry out fuel calibration checks on the majority of turbine powered aircraft that use capacitance type systems for sensing fuel quantity levels.
- 6.3.2.2 If an aircraft utilises a float type system but also has a built-in self-test system that verifies correct functioning of the fuel quantity measurement system within the aircraft manufacturers stated tolerances, then it is also excluded from the recalibration requirement.

6.3.3 Combustion type aircraft cabin heaters

- 6.3.3.1 CAO 100.5 no longer specifies maintenance requirements for combustion type cabin heaters. Manufacturers' maintenance instructions and state of design airworthiness directives adequately provide for safe and effective maintenance of these components.

Appendix A

Training in a certificate of approval - composite maintenance

A.1 Composite aircraft repairs

A.1.1 Course objectives

A.1.1.1 On completion of this training, a B1 Part 66 licence holder will be proficient in the application of hand skills and knowledge and the use of maintenance publications to inspect and repair aircraft composite structures and components to an acceptable standard of airworthiness.

A.1.2 Reference material

A.1.2.1 The B1 Part 66 licence holder should use the following reference material:

- FAA AC 43-13: current edition
- MEA367 - Repair/modify aircraft composite structure using cold bonding
- applicable aircraft maintenance data
- specific material instructions where applicable.

A.1.3 Theoretical knowledge

A.1.3.1 Theory training will be given either informally as an exchange between the person providing the training or in a classroom environment at the discretion of the training provider.

A.1.3.2 A trainee will be trained to understand the types of composite materials that are used in aircraft construction, their properties, strengths and limitations and attain the knowledge levels listed in section A.3.

A.1.3.3 A trainee will be required to demonstrate knowledge of the following topics to the knowledge level shown in column 2 of Table 1.

A.1.4 Training provider

A.1.5 Training should be provided by a person who holds a recognised qualification in aircraft composite maintenance.

A.1.6 The trainer qualifications could be a relevant trade training background, military qualifications or civil qualifications recognised by CASA or the national aviation authority of a country mentioned in regulation 21.010B of CASR.

Table 1: Knowledge elements

Topic	Level	Achieved	
		Y/N	Date and signature
How to obtain relevant material safety data sheet (MSDS)	2		
The use of applicable items of personal protection equipment (PPE)	2		
Work health and safety (WHS) procedures	2		
Aircraft construction principles	2		
Differences between epoxy and polyester resin systems	1		
Defining composite terminology	2		
Composite component construction methods, including structural assembly fastener identification.	3		
Storage requirements for prepreg materials	2		
With regard to various resins and hardeners, their: <ul style="list-style-type: none"> • limitations • storage requirements • mixing precautions • spreading requirements • assembly times • clamping/vacuum bagging/heat curing requirements • environmental protection requirements • compatibilities. 	2		

A.1.7 In order to be eligible for a composite aircraft maintenance authorisation, a LAME must satisfactorily complete each of practical tasks in Table 2 at least once.

Table 2: Practical task training

Task	Competent	
	Y/N	Date and Signature
Using aircraft components or panels that simulate aircraft components:		
perform a cold layup using one of the following materials: <ul style="list-style-type: none"> • Carbon graphite • Kevlar • Fibreglass • Aluminium. 		
perform a repair to a honeycomb core panel using aluminium, Nomex or foam		
perform composite component repairs using: <ul style="list-style-type: none"> • external patch repair • scarf repair • stepped repair • wet layup repair. 		
perform composite fastener hole repair		
perform metal to metal and metal to composite bonding		

A.2 Assessment of performance standard

A.2.1 A trainee’s performance of each of the maintenance tasks in Table 2 will be assessed against the criteria specified in Table 3.

Table 3: Performance standard assessment criteria

Assessment topic	Satisfactory	
	Y/N	Date/Signature
General		
Trainee: <ul style="list-style-type: none"> • applies relevant WHS procedures, including the use of MSDS and PPE uses approved maintenance documentation and aircraft publications relating to aircraft structure • identifies composite component applications in aircraft structures • identifies various aircraft composite materials/resins and their basic properties by interpretation of markings and visual means • handles and stores composite materials to industry standards • assesses composite component damage using visual and tap test methods • correctly interprets and/or produces repair scheme/modification drawings/sketches • uses appropriate hand tools and machines to disassemble and assemble aircraft composite components, parts, sections and skin, including extraction/installation equipment, drilling/cutting equipment and material fasteners. 		
Planning and preparing for the repair or modification		
While performing practical tasks listed in Table 2, the trainee will be assessed against the following elements: <ul style="list-style-type: none"> • Extent of damage is correctly assessed to assist in determining repair procedure • Structure is supported and prepared in accordance with the applicable maintenance manual to ensure personnel safety and freedom from damage • Appropriate modification or repair scheme is identified in accordance with structural repair manual and/or approved data • Specialist advice is obtained in establishing an approved repair scheme where a standard repair scheme cannot be identified or damage criteria is out of limits • All materials and equipment required are organised. 		
Preparation of components for cold bonding		
<ul style="list-style-type: none"> • Components are prepared in accordance with applicable process specification (provided by the manufacturer) • Bagging (if applicable) is checked to ensure vacuum seal is correct • Equipment is checked for serviceability to ensure safety in application. 		
Performing cold bonding repair or modification		
<ul style="list-style-type: none"> • Lay-up of materials is checked to confirm that components meet required specifications and bagging equipment is correctly installed and operated • Curing cycle and recording of operating cycle data are monitored as required by approved procedures to ensure specifications are met 		

Assessment topic	Satisfactory	
<ul style="list-style-type: none"> • Blemishes are sealed, potted or filled, where necessary, in accordance with applicable process specification • Component assemblies, including test pieces, requiring further or special treatment are made ready for the appropriate processes • Required maintenance documentation is accurately completed and correctly processed • Completed assemblies are tagged, sealed or packaged, as required. 		

A.2.2 At the successful completion of the training and assessment in all tasks, the employee will be issued with a document stating they have satisfactorily completed the course of training to the required standard. Under subregulation 42ZC (6) the employee may submit the document to CASA in support of an application for a maintenance authorisation.

A.3 Explanation of knowledge levels

A.3.1 Level 1

A.3.1.1 A familiarity with the principal elements of the topic such that the following trainee objectives are met:

- familiar with the basic elements of the topic
- able to give a simple description of the topic, using common words and examples
- able to use typical terms.

A.3.2 Level 2

A.3.2.1 A general knowledge of the theoretical and practical aspects of the topic and an ability to apply that knowledge, such that the following trainee objectives are met:

- understand the theoretical fundamentals of the topic
- give a general description of the topic using typical examples, as appropriate
- demonstrate awareness of practical applications of the topic.

A.3.3 Level 3

A.3.3.1 A detailed knowledge of the theoretical and practical aspects of the topic, and a capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner, such that the following trainee objectives are met:

- Describe the underlying intent and implications of the topic
- Give a detailed description of the topic using theoretical fundamentals and specific examples
- Explain in detail the theoretical and practical application of the topic
- The employee is required to demonstrate a comprehensive understanding of the maintenance manuals and other data related to the training which is being given.