Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
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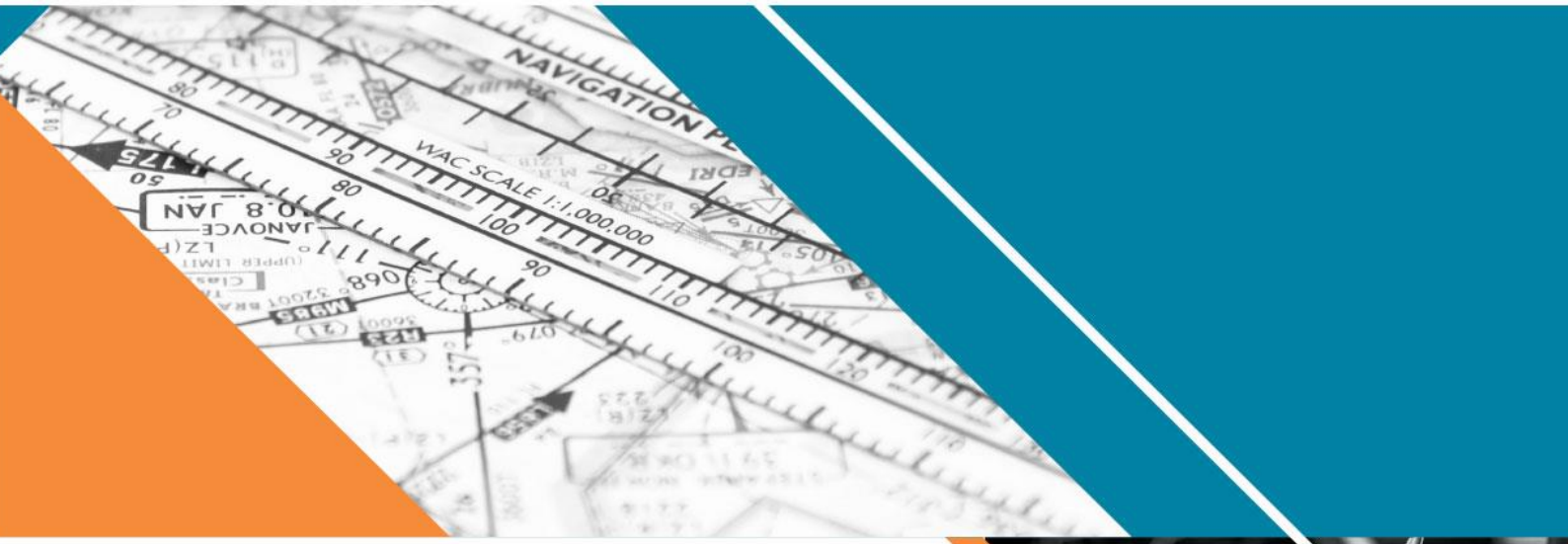

Manned free balloons - Continuing airworthiness

Date	November 2024
File ref	D24/359673

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 operators of manned free balloons used for commercial and private operations currently regulated under the *Civil Aviation Safety Regulations 1998* (CASR) and the *Civil Aviation Regulations 1988* (CAR). Under CASR Part 131, Part 131 aircraft are used for balloon transport operations, specialised balloon operations and recreational activities. Part 131 commenced on 2 December 2021 and the Part 131 MOS commences on 12 November 2024. CASR Part 131 does not yet include rules for continuing airworthiness and maintenance. Commercial balloon flying training is a prescribed activity under regulation 206 of CAR.

Purpose

This AC provides guidance and acceptable means of compliance for operators of manned free balloons and hot air airships. This AC applies to hot air airships and these types of manned free balloons:

- Hot air balloons
- Gas balloons
- Mixed (gas and hot air) balloons

The scope of this AC is limited to continuing airworthiness and maintenance matters.

For further information

For further information on this AC, contact the Civil Aviation Safety Authority's Airworthiness Engineering Branch (telephone 131 757).

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

Status

This version of the AC is approved by the Manager, Airworthiness Engineering Branch.

Note: Changes made in the current version are annotated with change bars.

Version	Date	Details
v2.2	November 2024	The supervision of maintenance instrument CASA EX 74/18 has been replaced with CASA EX 40/24. Part 131 Exemptions and Directions Instrument CASA EX 62/24 has been made. CAO 95.53 has been repealed and a new CAO 95.54 commences on 12 November 2024.
v2.1	February 2024	An amendment has been made to recognise CASR Part 131 and MOS is in force. Standard guidance for Definitions has been added.
v2.0	October 2020	This version omits operational information on the use of inflation fans that can now be found in AC 131-02 - Manned free balloons – Operations. A note on quick shut off valves has been added. Minor technical amendments have been incorporated.
v1.2	July 2018	CASA EX 115/15 has been replaced with CASA EX 74/18.
v1.1	June 2016	A note has been added to section 2.1.3 to clarify that certification approvals for balloons are covered by Part 21, not Part 31.
v1.0	April 2016	Initial issue of this AC. This AC replaces CAAP 41-1(1). In addition to the information detailed in CAAP 41-1(1) this AC provides additional guidance on: • Part 31 • mixing of balloon components • alignment of the time-in-service definition with standard industry practice • precautions to be taken when using inflation fans.

Contents

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
AD	Airworthiness Directive
AOC	Air Operator's Certificate
ATSB	Australian Transport Safety Bureau
CAO	Civil Aviation Order
CAR	*Civil Aviation Regulations 1988*
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
COA	Certificate of Approval
EASA	European Aviation Safety Agency
FAR	Federal Aviation Regulations
MA	Maintenance Authority
PIC	pilot in command

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Term	Definition
Approved maintenance data	Regulation 2A of *the Civil Aviation Regulations 1988* (CAR) specifies the constituent requirements, specifications and instructions that are contained in the maintenance data applicable to the maintenance of an aircraft and its aeronautical products. Balloons and airships are aircraft comprised of aeronautical products.
Hot air balloon	A manned free balloon that derives its lift from heated air.
Balloon component	The basket or gondola, burner, and any other associated aeronautical components of the aircraft (including fuel tanks).
Class B aircraft	A balloon is designated to be a class B aircraft in accordance with subregulation 2 (1) of CAR.
Hot air airship	A power driven lighter-than-air aircraft where the engine does not create any portion of lift.

Term	Definition
Major repair	The repair of damage that involves the replacement of any of the following: • one or more panels in the upper half of the envelope • four or more panels in the lower half of the envelope • load tape repairs or replacement • any metal repairs requiring welding (including basket frames, load frames, burners and fuel tanks) • the making of any repair to the envelope suspension system or basket cables • any repair to the burner system other than replacement of seals or the cleaning of jets • any other repairs identified in the manufacturer's manual or approved maintenance data as major repairs.
Manned free balloon	A free balloon that: (a) is equipped to carry one or more persons; and (b) is equipped with controls that enable the altitude of the balloon to be controlled
Time-in-service	The time from first lift off to final landing, prior to deflation, at the completion of the flight, whether free or tethered. For inflations where the balloon does not leave the ground, then burner on to burner off time should be recorded as the time-in-service.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Document	Title
Part 31 of CASR	Airworthiness standards for manned free balloons
Part 39 of CASR	Airworthiness Directives
Regulation 2A of CAR	Approved Maintenance Data
Regulation 30 of CAR	Certificates of Approval
Regulation 33B of CAR	Airworthiness Authorities
Regulation 41 of CAR	Class B aircraft maintenance schedule and instructions
Regulation 42A of CAR	Maintenance schedule: manufacturer's maintenance schedule
Regulation 42C of CAR	Maintenance schedule: approved system of maintenance
Regulation 42E of CAR	Elections
Regulation 42M of CAR	System of maintenance: approval
Regulation 42W of CAR	Installation and use of aircraft components
Regulation 42WA of CAR	Requirements for authorised release certificate
Regulation 42ZC of CAR	Maintenance on Australian aircraft in Australian territory
Regulation 42ZE of CAR	Certification of completion of maintenance on aircraft in Australian territory
Regulation 50A of CAR	Aircraft log book

Document	Title
Regulation 50B of CAR	Alternative to aircraft log book
Regulation 51 of CAR	Reporting of defects in Australian aircraft
Schedule 6 of CAR	CASA system of certification of completion of maintenance
Part 5 of Schedule 7 of CAR	Specific maintenance on manned balloons and hot air airships
Part 2 of Schedule 8 of CAR	Maintenance on balloons
Civil Aviation Order (CAO) 95.53	Exemption from provisions of the Civil Aviation Regulations 1988 - Manned balloons and hot air airships - Aerial work & charter operations
CAO 95.54	Manned balloons and hot air airships (Part 131 Recreational Activity and Specialised Balloon Operations) Instrument 2024
CAO 100.5	General requirements in respect of maintenance of Australian aircraft
CAO 101.54	Airworthiness certification requirements – manned free balloons
CAO 100.96	Administration and procedure - weight control of balloons
CASA Instrument EX 40/24	Exemption – to allow supervision of maintenance on manned free balloons
CASA Instrument EX 62/24	Part 131 Exemptions and Directions Instrument
FAR Part 31	US Federal Aviation Administration Airworthiness standards - Manned free balloons
EASA CS-31HB/GB	European Certification Specifications for Hot Air Balloons/Gas balloons

1.4 Forms

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

Form number	Title
Form 902	Non-recurring AD, Special Inspection and Modification and Certification Log
Form 924	Aircraft maintenance certification log
Form 925	Logbook statement Part 1
Form 927	Recurring Airworthiness Directive Control
Form 928	Recurring maintenance control
Form 933	Lifed aircraft equipment record
Form 936	Weight and balance record
Form 946	Component history card

2 Airworthiness standards for manned free balloons

2.1 General

2.1.1 Part 31 details the airworthiness standards applicable to manned free balloons.

2.1.2 Part 31 provides for automatic recognition of the United States of America (USA) Federal Aviation Regulations (FAR) Part 31 and European Aviation Safety Agency (EASA) CS-31HB airworthiness standards for manned free balloons and changes to those standards.

2.1.3 Given that automatic recognition, the approvals given under those regulatory systems may be taken to be an approval granted by the Civil Aviation Safety Authority (CASA). CASA may also give, suspend or cancel such approvals.

Note: The provisions in Part 31 for acceptance of approvals granted by the Federal Aviation Administration (of the USA) under FAR Part 31, or EASA under CS-31HB or CS-31GB, only apply in relation to approvals specifically granted under those regulations. Certification approvals such as type certificates, supplemental type certificates and modification/repair design approvals are covered by Part 21.

3 Maintenance requirements

3.1 Maintenance schedule

3.1.1 Balloons are classified as class B aircraft, which are required under regulation 41 of CAR to have a maintenance schedule.

3.1.2 A balloon certificate of registration holder may maintain a balloon according to the manufacturer's maintenance schedule (regulation 42A of CAR) or an approved system of maintenance (regulations 42C and 42M of CAR).

3.1.3 Regulation 42E of CAR requires the selected schedule to be entered on the balloon's logbook statement (Form 925), a copy of which is required to be forwarded to the CASA office that has administrative control over that balloon's records.

3.1.4 Regulation 42ZC of CAR specifies that all maintenance that is performed on balloons must be performed by appropriate persons. Major repairs, as per Part 5 of Schedule 7 of CAR, may only be performed under the control of an appropriate certificate of approval (COA) holder, issued under regulation 30 of CAR.

3.1.5 Certain repairs where the manufacturer has not been consulted may be prohibited. Examples include the following:

- replacement of original fabric panels exceeding 50% of the total panel count
- welding repairs
- swaging
- repair of flying wires or basket wire assemblies.

3.1.6 The appropriate persons to perform and certify for inspections or maintenance are listed below:

- the pilot in command (PIC) or a person authorised to operate the aircraft (other than a student pilot) is limited to:
  - post-assembly daily or pre-take-off inspections
  - maintenance specified in Part 2 of Schedule 8 of CAR, in accordance with paragraph 42ZC (4) (db) of CAR.

Note: For balloons operated under an Air Operator's Certificate (AOC), the pilot should be assessed as competent to perform the activities in Part 2 of Schedule 8 of CAR and approved by the AOC holder prior to the task being performed.

- A person mentioned in section 3.2.

3.2 Repairs and maintenance

3.2.1 The only persons permitted to conduct inspections and maintenance (other than pilots mentioned in 3.1.6) are:

- the holder of a maintenance authority (MA) under regulation 33B of CAR
- the holder of an authorisation issued under subregulation 42ZC (6) of CAR to the extent indicated on the authority

- a supervised employee of a COA holder in accordance with CASA Instrument EX 40/24
- a person under the supervision of a person permitted by paragraph 42ZC (4) (e) of CAR in accordance with EX 40/24.

3.2.2 Periodic inspections required by the maintenance schedule should be complied with at the following periods:

- for all balloons every 100 hours' time-in-service or 12 months (whichever is the earlier)
- where mixing of the balloon's components approved for interchanging with those of another balloon has occurred, i.e. when a component is added to an airworthy envelope or a basket or gondola associated with that envelope, then an operator should have a system to ensure that all components:
  - are approved for compatibility and
  - are within the required inspection period and
  - the inspection period will not expire during the planned flight.

3.2.3 An operator should have a system to ensure that, for a planned flight with a combination of components attached to an envelope, a weight and balance record (Form 936) or a manufacturer's record of balloon component weight or weight alteration has been completed and a loading system specified. An acceptable means of compliance is for a balloon logbook or technical record to contain separate calculated records of weight alteration for the various combinations of components used.

Note: These complete weight records may be produced from previously certified component weight records rather than actual weighing of each component combination.

3.2.4 As an Airworthiness Directive (AD) is a direction under Part 39, any additional special inspection, test, check or modification requirements that are contained in an AD must be observed.

3.2.5 As the logbook, or technical log if used (see section 5), also performs the function of the maintenance release, any maintenance that will be required to be performed on the balloon between each periodic inspection is required to be entered in the logbook or technical log and certified by a person who is authorised to make the certification.

3.2.6 Providing the aircraft logbook is used for a similar purpose, a manned free balloon is exempted from the requirement for a maintenance release to be issued in accordance with Division 9 of Part 4A of CAR in instrument CASA EX 62/24 (Federal Register of Legislation - CASA EX 62/24 – CASR Part 131 – Exemptions and Directions Instrument 2024).

3.3 Maintenance certification requirements

3.3.1 Regulation 42ZE of CAR directs that all maintenance is to be certified. When maintenance has been completed an entry and certification is required in the balloon's logbook to record maintenance and should include:

- periodic inspections as per section 3.2.2
- hard landing inspection whenever a landing has been made while the balloon was experiencing a high rate of descent if damage is suspected

- defect rectifications
- repairs
- modifications
- component replacements
- post power line or lightning electricity strike
- an envelope inspection post overheating as indicated by an envelope temperature monitoring device
- special inspections, tests, checks or modifications specified as a requirement of an airworthiness directive.

3.3.2 The entries and certifications need to include a complete and detailed description of:

- the maintenance that has been performed
- the data referenced
- the form tracking number from the Authorised Release Certificate (Form 1), or equivalent, of any material or parts used
- the authority and signature of the certifier
- the date the maintenance was completed
- the aircraft total time-in-service
- if a periodic inspection was completed when the next periodic inspection is due.

3.3.3 When an inspection or maintenance has been successfully completed and the aircraft is airworthy the certifier should certify that the aircraft is released or returned to service.

4 Maintenance records

4.1 Requirements

4.1.1 A balloon, for the purpose of record keeping, means the envelope and suspension system, which is the specified aircraft, plus its associated components.

4.1.2 A balloon requires a logbook to record its airworthiness and maintenance history, and maintenance certifications. An approved logbook is the CASA Aircraft Maintenance Certification Log (Form 924) and other associated CASA record keeping documents (refer to section 5).

4.1.3 The basket and burner are major components of a balloon and separate maintenance certification logs (Form 924) may be retained. Where regular interchange of components occurs, as in section 3.2.2, it is recommended that the operator maintains separate maintenance certification logs for the major components as appropriate. Where no interchange of components is made, one balloon maintenance certification log (together with the associated CASA record keeping documents) is sufficient.

4.1.4 A logbook needs to be retained by the certificate of registration holder, in accordance with CAO100.5, for at least 12 months after the balloon has been withdrawn from service. Alternative compliant logbooks may be used as specified in subsection 4 of CAO 100.5.

5 Logbook or technical log

5.1 Technical log use

5.1.1 An operator may use a CASA-approved logbook and/or an alternative (generally described as a technical log) for recording time in service and maintenance. A release to service entry in the logbook or technical log after an inspection or maintenance has been completed constitutes the maintenance release.

5.2 Log entries

5.2.1 The logbook(s) and/or the technical log is to be made available to the PIC prior to and at the completion of each flight. The PIC should make an entry to record the flight time, both daily and cumulative, in the logbook(s) or technical log, as soon as practicable after each flight.

5.2.2 If no defects have been noted, and the aircraft is airworthy, the PIC should note in the aircraft logbook or technical log at the completion of each flight 'Nil defects'.

5.2.3 If a defect has been noted an entry needs to be made in the aircraft logbook, and technical log if used, to identify and highlight damage or defects that, if not corrected, could compromise the safe operation of the balloon. This entry must be signed and dated by the person making the entry.

5.2.4 Provided the damage or defect mentioned in the entry does not render the balloon or component unairworthy, that entry may be endorsed to indicate assessment has been made in accordance with the manufacturer's maintenance manual, noting that the balloon is serviceable and airworthy. This further entry may only be made by the following personnel:

- the holder of a valid appropriate MA under regulation 33B or subregulation 42ZC (6) of CAR
  - the PIC (being other than a student pilot) for the maintenance that is detailed in Part 2 of Schedule 8 of CAR, in accordance with paragraph 42ZC (4) (db) of CAR
  - the pilot must be the holder of a commercial pilot (balloon) licence or a private pilot (balloons) permit that is valid for the balloon as per paragraph 42ZC (4) (db) of CAR.
- An AOC holder may require a pilot to be approved by the AOC holder to make logbook entries.

5.2.5 Where a balloon or component has become unairworthy, the defect needs to be entered in the logbook, and technical log if used. The balloon should not be flown until there is an entry in the logbook, and technical log if used, certifying that the maintenance necessary to rectify the defect has been completed by either:

- the holder of a valid appropriate MA

  or
- a person authorised to do so on behalf of a COA holder.

5.2.6 It is an offence under the CARs for a person to cancel an entry if the defect has not been rectified.

6 Quick shut off valve

6.1 The QSOV design

6.1.1 The quick shut off valve (QSOV) can be fitted to any liquid withdrawal tap on a balloon fuel tank and can be used to replace a hand wheel liquid valve with a rego connector. The picture below shows a QSOV fitted to a balloon fuel tank.

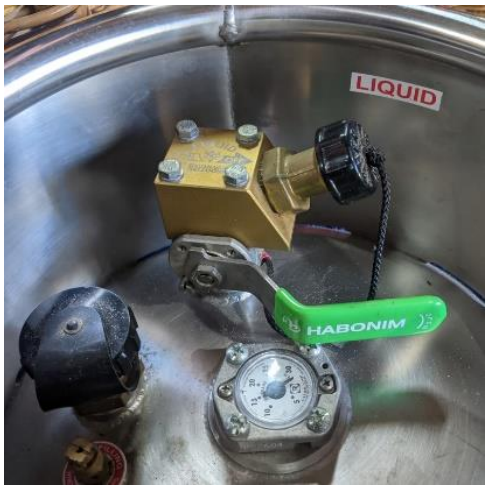

Figure 1: QSOV

Source: Picture supplied by Kavanagh Balloons Pty Ltd

6.2 The advantage of a QSOV

6.2.1 The 90-degree action ball valve provides a quick opening and closing action and a clear visual indication of the position of the valve. In an emergency this may be critical.

6.2.2 Where possible, CASA recommends the use of QSOVs on all balloon fuel tanks and particularly on those used by operators of balloon transport flights.