Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 131-02 v3.0

Manned free balloons – Operations

For the Part 131 MOS commencing on 12 November 2024.

File ref: D22/63723

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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 persons conducting:

- balloon transport operations
- commercial balloon flying training
- specialised balloon operations
- Part 131 recreational activities in Part 131 aircraft.

This AC does not apply to permanently tethered gas balloon operations as described under Subpart 131.Z of CASR.

Part 131 aircraft are hot air balloons, gas balloons, mixed (gas and hot air) balloons and hot air airships.

Purpose

This AC provides guidance on a topic basis which is different to the Part 131 AMC/GM document which provides guidance on a regulation number basis. The topics covered in this AC are:

- flight preparation (weather assessment)
- passenger safety briefings
- inflation fan safety
- dangerous goods
- flying near sensitive areas
- vehicle assisted deflation and ground handling
- electronic documents.
- hot air balloon parachute valve stall

For further information

For further information, contact CASA's Operations Standards (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 Branch Manager, Flight Standards.

> **Note:** Changes made in the current version are not annotated. The document should be read in full.

Table 1. Status

Version	Date	Details
v3.0	November 2024	The major changes are: • updates to reflect the commencement of the Part 131 MOS on 12 November 2024 • update to notify the making of the Part 131 Exemptions and Directions Instrument CASA EX 62/24 • removal of references to the Australian Balloon Federation (ABF) (due to the cessation of the ABF as a sport aviation body in December 2023) • updates to the dangerous goods information in Chapter 6 to align with the requirements of section 23 of the Civil Aviation Act 1988, Part 92 of CASR and the ICAO Technical Instructions (relevant associated references were also added to Chapter 1) • deletion of Chapter 10 about flights over populous areas and public gatherings as the information has been moved into Chapter 8 of the Part 131 MOS and the GM 131.305 entry in the Part 131 AMC/GM document. • addition of a new Chapter 10 with information on the causes and effect of parachute valve stall in a hot air balloon
v2.0	December 2021	Complete replacement of Chapter 2. Major updates to regulatory references in section 3.1. Minor changes to regulatory references elsewhere. All changes are due to the commencement of Part 131 of CASR and reflect the interim legislative structure in place in the absence of the Part 131 MOS.
v1.0	October 2020	This is the first AC to be written on this subject. It provides new operational advice and includes operational guidance previously published in AC 131-01 - Part 131 Aircraft - Continuing airworthiness. The regulatory references in this document apply prior to the commencement of Part 131 on 2 December 2021. This document will be updated with new regulatory references at that time.

Contents

Acknowledgement of Country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and their continuing connection to land, water and community, and pays respect to Elders past, present and emerging.

Artwork: James Baban.

1 Reference material

1.1 Acronyms

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

Table 2. Acronyms

Acronym	Description
AC	advisory circular
AIP	Australian Information Publication
AMC	acceptable means of compliance
AOC	Air Operator's Certificate
ASAO	approved self-administering aviation organisation
ATSB	Australian Transport Safety Bureau
BOM	Bureau of Meteorology
CAO	Civil Aviation Order
CAR	*Civil Aviation Regulations 1988*
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
EASA	European Aviation Safety Agency
EFB	electronic flight bag
GAF	graphical area forecast
GM	guidance material
GPS	Global Positioning System
ICAO	International Civil Aviation Organization
MOS	manual of standards
PIC	pilot in command
SA	sensitive area
TSO	Technical Standard Orders
TWG	technical working group

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.

Table 3. Definitions

Term	Definition
airship	means a powered, lighter-than-air aircraft.
balloon	means an unpowered, lighter-than-air aircraft.
balloon flying training	means any training given during flight time in a balloon for the purpose of increasing a person's skill in flying the balloon. **Note:** Practically this encompasses both commercial balloon pilot licence training conducted as a prescribed purpose under paragraph 206 (a) of CAR in accordance with Part 5 of CAR, and training conducted as a Part 131 recreational activity relating to the private pilot balloon permit granted by CASA under CAO 95.54.
balloon transport operation	An operation is a balloon transport operation if the operation is: a. a passenger transport operation conducted using a Part 131 aircraft that is a registered aircraft or a foreign registered aircraft; and b. conducted for hire or reward; and c. undertaken wholly within Australia; and d. not undertaken as part of a flight into or out of Australian territory.
balloon transport AOC	an AOC that authorises the operation of a Part 131 aircraft for a balloon transport operation.
balloon transport operator	a person who holds a balloon transport AOC.
cargo	Things other than persons carried in an aircraft
commercial balloon flying training	balloon flying training for a balloon flight crew licence or balloon flight crew rating conducted in accordance with Part 5 of CAR for hire or reward.
free balloon	a. in Part 101—means a balloon that is not tethered; and b. otherwise—means a balloon that is intended for flight without being permanently tethered.
gas balloon	means a balloon that sustains flight with lighter-than-air gas.
hot air airship	means a power driven lighter-than-air aircraft where the engine does not create any portion of lift.
manned free balloon	means 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.
Part 131 aircraft	is any of the following:

Term	Definition
	a. a manned free balloon; b. a hot air airship.
Part 131 recreational activity	1. A Part 131 recreational activity means operating a Part 131 aircraft other than for one of the following: a. a balloon transport operation; b. a specialised balloon operation. c. balloon flying training (within the meaning of subregulation 5.01(1) of CAR) for the grant of a balloon flight crew licence (within the meaning of that subregulation) or a balloon flight crew rating (within the meaning of that subregulation). 2. A Part 131 recreational activity does not include operating a Part 131 aircraft in any circumstances prescribed by the Part 131 Manual of Standards for the purposes of this definition. **Note:** At the publication date of v3.0 of this document, the Part 131 Manual of standards did not prescribe any activities for the purpose of this definition.
passenger transport operation	An operation of an aircraft that involves the carriage of passengers, whether or not cargo is also carried on the aircraft, but does not include the following: a. an operation of an aircraft with a special certificate of airworthiness; b. a cost-sharing flight; c. a medical transport operation. d. if the registered operator of an aircraft is an individual—an operation of the aircraft: i that involves the carriage of that individual; and ii does not also involve the carriage of other passengers; or e. if the registered operator of an aircraft is an individual—an operation of the aircraft: i that involves the carriage of that individual; and ii involves the carriage of other passengers; and f. for which no payment or reward is made or given in relation to the carriage of the other passengers or cargo.
specialised balloon operation	An operation is a specialised balloon operation if the operation: a. is conducted using a Part 131 aircraft; and b. is not a balloon transport operation; and c. involves one or more of the following: i specialised instruments, indicators, items of equipment or systems that affect the flight characteristics of the aircraft and that are fitted to, or carried on, the aircraft; ii carrying a load (other than a hang glider) outside the aircraft; iii operating the aircraft for advertising, or making a film or television production, solely or predominantly for hire or reward; iv a flight into or out of Australian territory; v an activity prescribed by the Part 131 Manual of Standards for the purposes of this subparagraph. **Note:** At the publication date of v3.0 of this document, the Part 131 Manual of Standards did not prescribe any activities for the purpose of this definition.

Term	Definition
tethered	in relation to a lighter-than-air aircraft, means attached to the ground, or an object on the ground, by flexible restraints that limit movement.
these regulations	means the CAR and CASR.

1.3 References

Legislation

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

Table 4. Legislation references

Document	Title
Section 20A of the Civil Aviation Act (1998)	Reckless operation of aircraft
Section 23 of the Civil Aviation Act (1988)	Dangerous goods
Part 92 of CASR	Consignment and carriage of dangerous goods by air
Part 131 of CASR	Balloons and hot air airships
Part 149 of CASR	Approved self-administering organisations
Regulation 206 of CAR	Prescribed purpose - miscellaneous
CAO 40.7	Aircraft endorsements (balloons) and flight instructor (balloons) ratings
CAO 82.7	Air Operators' Certificates authorising commercial balloon licence or rating training
CAO 95.54	Civil Aviation Order 95.54 (Part 131 Recreational Activity and Specialised Balloon Operations) Instrument 2024
ICAO Technical Instructions	ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air Doc 9284
Part 131 Guide	Guide for balloons and hot air airships | Civil Aviation Safety Authority (casa.gov.au)

Advisory material

CASA's advisory materials are available at https://www.casa.gov.au/publications-and-resources/guidance-materials

Table 5. Advisory material references

Document	Title
AC 1-02	Guide to the preparation of expositions and operations manuals
AC 91-17	Electronic flight bags
AC 92-04	*Applications for permission to carry or consign dangerous goods under section 23 of the Civil Aviation Act 1988*.
AC 131-01	Manned free balloons - Continuing Airworthiness
AC 131-03	Transitioning to Part 131 – A guide for commercial balloon operators
AC 131-04	Management of change for balloon transport AOC holders
Part 131 AMC/GM	Acceptable Means of Compliance / Guidance Material

2 Overview of Part 131

2.1 Who does Part 131 apply to?

Note: For guidance on the meaning of, and compliance with, specific Part 131 requirements, CASA recommending pilots and operators first read the Part 131 AMC/GM document. This document contains, for each Part 131 regulation and supporting MOS requirement, pre-determined acceptable means of compliance and tailored guidance material.

This AC expands on some topics mentioned in the AMC/GM document.

2.1.1 Part 131 applies to all operations of Part 131 aircraft, except that Subpart 131.Z only applies to permanently tethered gas balloons and these aircraft do not need to comply with any of the rest of Part 131.

2.1.2 A Part 131 aircraft is defined to be a manned free balloon or a hot air airship. As there are multiple kinds of manned free balloons, a Part 131 aircraft in practice includes any of the following:

- hot air balloons
- hot air airships
- gas balloons
- mixed balloons (gas and hot air combination).

Note: Power-driven gas-filled airships are not a Part 131 aircraft and are not regulated by Part 131. Licensing rules for these aircraft are contained in Part 61 and the operational rules are solely contained in Part 91.

2.1.3 Part 131 aircraft operations are divided into four categories:

- **Balloon transport operations[1]:** These are passenger transport operations in a Part 131 aircraft conducted for hire or reward and operators are required to hold an AOC due to regulation 131.040. For detailed guidance on the meaning of hire or reward and possible exclusions from a flight being a passenger transport operation, read the GM 131.010 entry in the Part 131 AMC/GM document.
- **Commercial balloon licence/rating training:** These are flights for the grant of a licence or rating under Part 5 of CAR and operators are required to hold an AOC due to paragraph 206 (a) of CAR. These operations must comply with all relevant rules of Part 131 except those contained in Subparts 131.B and 131.Z. Specific additional legal requirements are contained in Civil Aviation Order (CAO) 40.7 and Civil Aviation Order (CAO) 82.7.
- **Specialised balloon operations[2]:** These are flights of Part 131 aircraft for specialised purposes, some of which may be conducted for hire or reward, but others may be non-commercial and therefore subject to the requirements that apply to a Part 131 recreational activity. To conduct a specialised balloon operation an operator is required to hold an approval from CASA in accordance with regulation 131.325.

1 Balloon transport operation is defined in regulation 131.010.

2 Specialised balloon operation is defined in regulation 131.020.

- **Part 131 recreational activities[3]:** these are flights of Part 131 aircraft that are not covered by any of the previous 3 categories.

2.2 Summary of legislation applying to the operation of a Part 131 aircraft

2.2.1 The Part 91 and Part 131 regulations plus the Part 131 MOS contain most of the rules that apply to the operation and use of Part 131 aircraft.

2.2.2 Part 91 and the Part 91 MOS perform an equivalent function for the rest of the aviation industry, with other operational Parts of CASR (121, 132, 133, 135, 137, 138, 141, 142) prescribing specific additional rules for certain kinds of operations in aeroplanes and rotorcraft.

2.2.3 The regulations applicable to commercial balloon pilot licensing, commercial balloon pilot training and continuing airworthiness and maintenance of Part 131 aircraft remain contained in *Civil Aviation Regulations 1988* and supporting CAOs (such as, but not limited to, CAO 40.7 and 82.7).

Note: See AC 131-01 for guidance on the continuing airworthiness requirements for Part 131 aircraft.

2.2.4 Much of Part 91 is 'turned off' (or disapplied) for Part 131 aircraft because the rules for multiple matters need to be specifically tailored to the operation of a Part 131 aircraft.

2.2.5 The list of disapplied Part 91 rules for the operation of a Part 131 aircraft are contained in subregulation 91.030 (3). Other rules in Part 91, such as the instrument flight rules (IFR) in Subdivision 91.D.4.3 of CASR, while not legally disapplied for Part 131 aircraft, are not practically applicable since Part 131 aircraft are not permitted to operate under the IFR.

2.2.6 CAO 95.54 continues to apply to Part 131 recreational activities because the Part 131 regulations were written under the assumption that a Part 131 ASAO would exist; however currently there is no Part 131 ASAO. Therefore, certain exemptions and directions are contained within CAO 95.54 enabling CASA to substitute for where a Part 131 ASAO is mentioned in the regulations or MOS. The CAO contains the private balloon pilot authorising regime as Part 131 does not yet contain licensing rules and Part 5 of CAR only contains commercial balloon flight crew licensing rules.

2.2.7 CASA has made a Part 131 Exemptions and Directions instrument CASA EX 62/24 (Federal Register of Legislation - CASA EX62/24 – CASR Part 131 – Exemptions and Directions Instrument 2024) applicable to Part 131 aircraft operations. This instrument includes an exemption from the requirement in Part 4A of CAR for a Part 131 aircraft to have a maintenance release document, providing the aircraft logbook is used for a similar purpose. This exemption was previously contained in CAOs 95.53 and 95.54.

2.2.8 To conduct a balloon transport operation or commercial balloon flying training you must hold an Air Operator's Certificate (AOC) that authorises the operation.

2.2.9 To conduct a specialised balloon operation, you must hold an approval issued under regulation 131.035.

2.2.10 To conduct a Part 131 recreational activity CAO 95.54 and the CASA Recreational Ballooning Procedures Manual apply to you.

2.2.11 To conduct a parachute descent from a balloon, see Multi-Part AC 105-03 and 131-05 - Parachute descents from a hot air balloon for guidance.

[3] Part 131 recreational activity is defined in regulation 131.025.

3 Flight preparation – weather assessment

3.1 Regulatory requirements

3.1.1 Section 20A of the *Civil Aviation Act 1988* (the Act) states that a person must not operate an aircraft being reckless as to whether the manner of operation could endanger the life of another person. A person must also not operate an aircraft being reckless as to whether the manner of operation could endanger the person or property of another person.

3.1.2 Regulation 91.055 states that the pilot in command (PIC) of an aircraft must not operate in a manner that creates a hazard to another aircraft, a person or property.

3.1.3 Part 131 requires balloon transport AOC holders to detail their weather assessment operational procedures in an exposition. CAO 82.7 requires the holders of an AOC authorising commercial balloon flying training to detail their operational procedures in an operations manual. Operators are advised that these 2 terms, *exposition* and *operations manual*, are different regulatory labels that are not intended to require any specific document format to be used. Operators are recommended to read AC 1-02 - Guide to the preparation of expositions and operations manuals.

3.1.4 The terrain to be flown over and seasonal meteorological conditions have considerable impact on the conduct of a balloon flight. A pilot's pre-flight weather assessment and resulting decision is a critical factor in determining the safety of a flight.

3.1.5 Section 12.02 of the Part 131 MOS sets out that:

- before commencing a flight, the PIC must study the authorised weather forecasts and authorised weather reports[4] for the planned flying area (including any expected changes to surface conditions and forecast winds) that apply for the period from commencement of the flight until 2 hours after the planned landing time
- the PIC may also study any other reasonably available weather information relevant to the intended flight
- for a flight in controlled airspace the PIC must study the weather reports and forecasts for any aerodrome within 10 NM of the planned flying area.

3.1.6 Regulation 131.367 requires a PIC to comply with the visual flight rules (VFR) for a Part 131 aircraft. The Part 131 VFR are contained in Chapter 19 of the Part 131 MOS. Subsection 19.02 (1) of the Part 131 MOS requires the PIC to ensure the aircraft is flown in accordance with the:

- criteria for visual meteorological conditions (VMC) for the airspace in which the flight is conducted

  or

- special VFR, but only if ATC has authorised the PIC to operate special VFR.

3.1.7 The VMC criteria are published in Chapter 2 of the Part 131 MOS. For convenience, they are repeated in Table 1 below.

[4] Authorised weather reports and authorised weather forecasts are produced by the Bureau of Meteorology (BOM).

Table 6. VMC for balloons

Class of airspace	Applicable height	Minimum flight visibility	Minimum distance from cloud	Operational requirements (if any)
Class A, C, E and G	At or above 10000 ft AMSL	8 km	1000 ft vertical 1500 m horizontal	For class C – subject to special VFR.
Class C	Below 10000 ft AMSL	5000 m	1000 ft vertical 1500 m horizontal	Subject to special VFR.
Class D	All of the Class D airspace	5000 m	1000 ft when above the cloud 500 ft when below the cloud 600 m horizontal	Subject to special VFR.
Class E	Below 10000 ft AMSL	5000 m	1000 ft vertical 1500 m horizontal	
Class G	Below 10000 ft AMSL	5000 m	1000 ft vertical 1500 m horizontal	The three rules below can override this rule.
Class G	Below the higher of 3000 ft AMSL or 1000 ft AGL	5000 m	Clear of cloud	Must be in sight of ground or water and carry a radio and use it on the appropriate frequency. The two rules below 150 0ft AGL can override this rule.
Class G	500 to below 1500ft AGL	5000 m	Clear of cloud	No vertical clearance from cloud only if the top of the cloud is at or below 500 ft AGL and the balloon is a minimum of 10 NM from an aerodrome with an instrument approach procedure (IAP).
Class G	Below 500 ft AGL	100 m	Not applicable	Day only. Minimum 10 NM from an aerodrome with an IAP.

3.1.8 The special VFR are published in Chapter 2 of the Part 131 MOS and, for convenience, are repeated in the AIP and in the list below:

- The relevant portion of the flight must be conducted in Class C or D airspace.
- The relevant portion of the flight must be conducted by day and clear of cloud.
- The pilot must have received a clearance from ATC to operate under the special VFR.

- The relevant portion of the flight must be conducted in a flight visibility that is not less than:
  - 100 m for a height below 500 ft AGL
  - 1600 m for a height at or above 500 ft AGL.

3.2 Weather and its effects on balloon operations

3.2.1 Flight in a balloon or hot air airship will be affected and potentially limited by the local weather conditions. The most important meteorological conditions for the PIC to consider before flight are:

- wind speed and direction
- storms, rain and showers
- fog, mist and visibility
- stability of the atmosphere.

3.2.2 It is essential to safe operations that pilots and operators conduct good weather assessments and apply sound risk-based decision making to every phase of flight.

Note: Incident and accident data has identified that the landing phase is the most dangerous flight phase in balloon operations.

3.2.3 Pilots and operators of Part 131 aircraft should be aware that the current AIP ENR 1.10 section 1.2 requirements relating to Forecasts **do not apply** to Part 131 aircraft. This is because this AIP content matches the Part 91 pre-flight weather forecast rules and these rules do not apply to Part 131 aircraft.

3.2.4 When practically implementing the Part 131 pre-flight weather assessment rules in section 12.02 of the Part 131 MOS, pilots and operators are advised that when conducting balloon operations away from an aerodrome that has a dedicated aerodrome forecast, the easiest method of compliance with these rules is for the pilot to obtain and review the graphical area forecast (GAF).

3.2.5 However, the GAF product does not provide a localised forecast for the smaller area of operations typically covered by a balloon flight.

3.2.6 Therefore, it is recommended that pilots and operators use additional localised products relevant to their area of operation.

Wind speed and direction

3.2.7 Many applications and websites from the Bureau of Meteorology (BOM) and other independent suppliers provide observations and computer modelling of ‘up to the minute’ wind speed and direction.

3.2.8 It is recommended that pilots and operators:

- familiarise themselves with relevant websites and applications useful to their area of operations and regularly review any version updates or new online sources of detailed weather information
- use a lighter-than-air gas filled small rubber balloon, known as a pibal, to estimate wind speed and direction at the launch (take-off) site and in the first few hundred feet above the surface.

3.2.9 The release of a pibal by trained ground crew at the planned landing area, and the communication of the wind speed and direction to the pilot, can significantly aid the pilot's decision making for the landing phase of a flight.

Storms, rain and showers

3.2.10 The BOM weather radar coverage encompasses most areas where balloon operations are conducted and is available on any internet connected device. The location, speed and direction of movement of storm cells or rain bands can easily be assessed so that flight in unsuitable conditions can be avoided.

3.2.11 In the event of a flight being conducted when there are showers in the area, pilots are encouraged to monitor the weather radar during flight, in conjunction with their own observations, and be prepared to land earlier than planned if the weather conditions are deteriorating. An early landing at an unplanned site under control is a better option than a landing at the planned site in poor weather.

Fog, mist and visibility

3.2.12 In valleys low level mist or fog in the early morning is a common occurrence. The nature of balloon operations is that the take-off and initial operations occur at the times of the day when these conditions have the largest operational impact. It is therefore essential that balloon pilots and operators have a thorough practical knowledge of these phenomena and, gather as much knowledge as possible on the peculiarities of the local area in which they are conducting operations. On any given day of operations, pilots and operators should be applying this background knowledge to make solid risk-based decisions regarding the safety of every flight. If operating in a new area, sources of knowledge on local weather conditions could include operators who have been operating in the area for some time, or the local BoM forecaster.

3.2.13 Although balloon operations can occur in Class G airspace with 100 m visibility below 500 ft AGL when outside 10 NM from an aerodrome with an approved instrument approach procedure[5] (and in any Class C or D airspace if the special VFR are complied with), it is **highly recommended** that pilots and operators exercise this significant reduction in the visibility requirements with caution and **only if** sufficient flight preparation has taken place.

3.2.14 As described in section 20A of the Act and regulation 91.055 of CASR, pilots and operators must not operate an aircraft in a reckless or hazardous manner that could endanger persons or property.

3.2.15 Pilots and operators are reminded that many aerodromes with approved instrument approach procedures may not have a ground-based navigation aid due to the use of a GNSS-based instrument approach procedure.

3.2.16 Therefore, pilots and operators are recommended to review the AIP-DAP publications or make direct contact with the aerodrome operator to confirm whether an approved instrument approach procedure exists for the aerodrome. A conservative approach is to identify whether the aerodrome is certified by viewing the aerodrome entry in the AIP-ERSA document as all aerodromes with instrument approach procedures must be certified, although it is possible for an aerodrome to be certified without an instrument approach procedure being present.

3.2.17 Pilots preparing to conduct a flight in areas and in conditions where fog limiting visibility is present, or which may form later, should conduct a risk assessment for the planned flight which should be appropriate to the operation on the day. The risk assessment should evaluate the pilot's skills and experience against the conditions which are present and relevant to that flight.

[5] Refer to the AIP-DAP publications to determine whether instrument approach procedures are published for a particular aerodrome.

A key aspect of the risk assessment is developing and discovering the present and relevant factors, even for experienced pilots that have often flown in foggy conditions.

3.2.18 Recommended techniques, and matters to obtain knowledge of, include the following:

- access as many local weather information sources and authorised meteorological forecasts as practicable
- reviewing the ambient temperature trend and the dewpoint
- obtain local observations of visibility and cloud cover along the planned route, and at possible landing areas, from personal observation on the drive to the launch site, or by communication from ground crew sent out to reconnoitre
- observations from high points in the terrain may provide a better overall picture of the conditions
- observations of the surface windspeed over high points may also be worth noting
- be aware that low level fog, especially (but not only) over inland bodies of water such as lakes or dams, will often thicken up after sunrise as the surface, and the air close to the surface, continues to cool
- if two or more balloons are operating in company it may be prudent to launch one balloon before the other(s) to allow the PIC to assess the conditions and communicate with the balloons still on the ground.

3.2.19 Because fog changes over time, its' movement, spread and depth are difficult to predict with accuracy, which can lead to pilots inadvertently flying into challenging weather situations.

3.2.20 Pilots are strongly recommended, if contemplating flying in conditions conducive to fog development even if fog is not forecast, to determine before flight how to manage the unpredicted occurrence of fog and have a plan in place to land at an alternative time and/or place.

3.2.21 While low level surface fog or mist is usually present when the wind conditions are calm or very light, pilots and operators should be aware that these conditions can also be present in higher wind conditions. Although a balloon does move slowly compared to other aircraft, taking off and landing in 100 m visibility when the wind has picked up can result in the pilot not having enough reaction time and balloon performance to avoid obstacles.

3.2.22 It is highly recommended that pilots consider these limitations if taking off or landing in conditions of reduced visibility.

Example:

A balloon travelling at 10 kts will take 19 seconds to travel 100 m horizontally.

A balloon travelling at 5 kts will take 38 seconds to travel 100 m horizontally.

Most hot air balloons used for recreation and commercial operations have maximum climb rates of about 1000 ft per minute or 5 m per second. A tall eucalyptus tree may be 50 m high.

A reasonably large balloon will contain 10 tonnes of hot air and possibly a tonne of payload. This is a significant aircraft mass. Despite the significant energy output of the propane burners, it may take up to 30 seconds for this mass to begin moving rapidly in a different vertical direction.

3.2.23 Emergencies can occur in the take-off and initial climb phase before the balloon has reached 500 ft AGL and the required better visibility. In these circumstances, if a safe immediate landing is to be performed, the pre-flight reconnaissance of the area surrounding the launch site will be invaluable in making a safe landing. Pilots need to have a solid knowledge of power lines, trees and other obstacles in the near vicinity of the launch site.

3.2.24 If an emergency occurs during flight, pilots should carefully consider their options for landing. Depending on the emergency, conducting a descent back into very low visibility conditions to conduct a landing at a site where the pilot does not have detailed obstacle knowledge carries significant risks.

3.2.25 Pilots should assess the relative risks for different emergencies involved with continuing flight to a landing site with better conditions versus landing immediately without adequate obstacle awareness in poor conditions.

Stability of the atmosphere

3.2.26 Thermals and atmospheric instability can seriously affect the safety of flight in lighter-than-air aircraft. In conditions of higher ambient temperatures, such as can exist in the summer months, pilots should be aware of the possibility that flying conditions may change very quickly as the temperature rises.

3.2.27 Pilots preparing to conduct a flight in higher ambient temperatures, when atmospheric instability may exist during the planned flight or on landing, should access as many local weather information sources and meteorological forecasts as practicable. Pilots should pay attention to any forecast temperature and humidity increases in the forecast period and be prepared to amend the flight plan.

3.2.28 To assist with quicker responses to control inputs in conditions of higher ambient temperatures, pilots should also be aware of the need to reduce the total load of the aircraft and should not plan to fly at maximum all up weight (MAUW).

4 Passenger safety briefing

4.1 Regulatory requirements

4.1.1 Regulation 131.410 and Chapter 23 of the Part 131 MOS prescribe the:

- matters that must be included in the safety briefing and instructions given to passengers before a Part 131 aircraft takes-off
- circumstances under which the PIC must give passengers a safety briefing and instructions during the flight.

4.1.2 Although not specifically and solely about passenger safety briefings, as a related matter, it is a requirement of regulation 131.570 and Chapter 27 of the Part 131 MOS that all flight crew members and ground support personnel involved in boarding and briefing passengers, or who may be involved in assisting during an emergency, must successfully complete the operator's proficiency test on initial deployment and thereafter every 24 months.

4.1.3 Overview of safety briefings

4.1.3.1 This section sets out some practices recommended by CASA for briefing passengers before and during flight.

4.1.3.2 The landing phase has the greatest risk of injury to a passenger and well briefed passengers can mitigate the hazards present in both normal and abnormal situations.

4.1.3.3 The basic briefing is the minimum briefing that a passenger embarking on a flight in a lighter-than-air aircraft should be given by the PIC, or by a person or other briefing system designated for the purpose by the PIC. It should include information, instruction, and demonstration where appropriate, about safety matters in such a way that the information is easily understood and retained.

4.1.3.4 Balloon transport operators may use trained ground support personnel who can assist with the briefing of passengers. Such personnel may assist with the briefing by translating into languages other than English or by presenting written, graphic or video safety instructions.

4.1.3.5 Commercial balloon flying training operators should ensure that the required passenger safety briefings are included in the training syllabus for the CP(B)L and practiced by the student on every training flight.

4.1.4 Pre-boarding briefing

4.1.4.1 Balloon transport operators should provide passengers with safety information before they arrive at the launch site. The information should include instruction on:

- the accessible and restricted access areas of the launch site
- the dangers of the inflation fan
- any assembly point for use in an emergency
- suitable clothing - wearing high heels is not recommended because of the risk of ankle injury on touch down
- the procedures for boarding the aircraft
- the authority of the pilots and ground support personnel.

4.1.5 Pre-flight briefing

4.1.5.1 When all passengers on a balloon conducting any kind of operation, but not including a hot air airship, are boarded each person must have access to at least one handhold and have enough room to adopt a safe landing position. The safety briefing will usually be conducted by the PIC and should include the following:

- an instruction and demonstration of the landing position, appropriate to the balloon design, that a passenger must adopt for landing
- an instruction on where to hold on to internal handholds
- an instruction to flex the knees on touch down to minimise the effect of any impact during landing
- in baskets fitted with seats, an instruction to sit down on the seats before landing
- an instruction to stow cameras and personal items before landing
- an instruction to remain in the basket at all times until instructed to disembark
- an instruction to precisely follow the instructions of the PIC or ground support personnel in the event of an emergency
- an instruction that smoking is prohibited
- a reminder that dangerous goods are prohibited
- an instruction on the use of any other safety or emergency equipment carried (e.g. life jackets).

4.1.5.2 A passenger on a hot air airship must be seated in a seat with a seat belt or harness and the safety briefing must be conducted by the PIC in accordance with the aircraft flight manual.

4.1.6 Pre-landing briefing

4.1.6.1 On approach to a landing the PIC of a balloon shall make a pre-landing announcement reminding passengers that:

- cameras and loose personal items must be stowed
- on command all passengers must assume the previously practiced landing position
- all persons must remain on board until instructed to disembark
- if a fast or hard landing is expected, a reminder of the need to hold on firmly and adopt a lower position in the basket on touch down.

4.1.7 On final approach to landing the PIC should ensure all passengers are comfortable in the landing position and be prepared to correct any anomalies before touch-down.

5 Inflation fan

5.1 General

5.1.1 The following advice applies to all aircraft that may use a portable powered fan to assist with initial cold inflation. Hot air balloons and hot air airships regularly use a portable fan for cold inflation. Gas balloons do not need inflation fans.

Note: This advice in chapter 5 was previously published in AC 131-01 v1.2.

5.2 Australian Transport Safety Bureau advice

5.2.1 In July 2013 the Australian Transport Safety Bureau (ATSB) issued the following safety advisory notice (SAN) AO-2013-116-SAN-003:

The Australian Transport Safety Bureau advises balloon operators to review their risk controls in relation to the safety of cold-air inflation fans, especially in relation to passenger proximity to operating fans, and the security of loose items, such as passenger clothing.

5.2.2 The ATSB advise that suitable procedures should be in place when using portable powered fans:

Portable powered fans are regularly used to cold inflate hot air balloons. These inflation fans with rapidly spinning propellers are potentially dangerous and all balloon operators should have procedures for ensuring their safe use.

5.2.3 CASA endorses the ATSB advice and recommends that pilots and operators follow the fan operating procedures guidance in section 5.3 of this AC.

5.3 Recommended inflation fan operating procedures

5.3.1 CASA's recommended safe operating procedures to be followed when using portable powered inflation fans include:

- fan blades or propellers should be protected by a protective guard, grill or cage constructed so that clothing, loose hair or other items cannot be easily drawn in or become entangled with the moving parts[6]
- fans should be clearly marked with signs or placards indicating danger and the need to keep clear
- all fans should be fitted with a kill switch facilitating an instant shut down
- any ground support crew or other personnel working around the balloon should be briefed on the operation of the fan and know how to operate the kill switch
- the immediate area surrounding an operating fan should be marked with a safety cone or cones and/or barrier to define an exclusion zone for all but trained personnel

6 For guard, grill or cage standards, refer to International Standard ISO 12499:1999.

- during operation, the fan should be placed so that the pilot-in-command (PIC) or a trained person attending the fan can easily reach the kill switch
- during windy inflations, extra care should be taken to avoid a moving basket knocking over a running fan. Care should also be taken to avoid any part of the envelope or control lines coming into contact with the fan. The PIC or person delegated by the PIC should ensure the fan is switched off as soon as it is no longer required and moved away from the basket.

5.3.2 Balloon transport operators must ensure passengers are briefed verbally or by other means to stay clear of the fan while it is running and warned not to approach the fan wearing loose items of clothing or scarves. Refer to section 4.1.7 (Pre-boarding briefing) of this AC.

5.3.3 It is recommended that balloon transport operators do not pre-load passengers into the basket during the cold inflation phase. Passengers should only be boarded when the basket is in the upright position.

5.3.4 Regulation 131.195 (for balloon transport operators) and CAO 82.7 paragraph 5.5B (for commercial balloon licence/rating training AOC holders) requires the operator's exposition or operations manual (as applicable) to contain, with respect to the flight operations of all types of aircraft operated by the operator, such information, procedures and instructions as necessary to ensure the safe conduct of the flight operations[7]. Noting these requirements, operators must detail their fan operating procedures in their exposition.

[7] Other than information, procedures or instructions that are set out in other documents required to be carried in the aircraft in pursuance of these Regulations.

6 Dangerous goods

6.1 Regulatory requirements related to dangerous goods

6.1.1 The governing legislation for transporting dangerous goods (DG) by air is the Act, which is supported by Part 92 of CASR.

6.1.2 Section 23 of the Act states that an aircraft must not carry dangerous goods, or a person must not carry or consign for carriage any goods on board an aircraft except in accordance with the regulations or with permission from CASA.

6.1.3 Part 92 of CASR *Consignment and carriage of dangerous goods by air* is applicable to all Australian aircraft and all foreign aircraft (other than state aircraft) operating in Australian territory (see regulation 92.005).

6.1.4 Detailed requirements and procedures for the carriage of DG by air are contained in the *ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air Doc 9284* (ICAO Technical Instructions). It is accepted in the Australian aviation industry that documents, such the IATA Dangerous Goods Regulations, provide equivalent or more restrictive requirements to those in ICAO Technical Instructions.

6.1.5 In most instances, the carriage of dangerous goods cargo (i.e. freight) on board a balloon would not be permitted unless the operator has applied to CASA for permission under section 23 of the Act. For further information on making an application to CASA for a section 23 permission refer to *AC 92-04: Applications for permission to carry or consign dangerous goods under section 23 of the Act*.

6.2 Dangerous goods permitted to be carried by passengers and crew

6.2.1 Regulation 92.035 and Part 8 of the ICAO Technical Instructions provide for certain DG items that are permitted to be carried on board an aircraft by passengers or crew, such as (but not limited to) mobile phones, cameras and power banks. Such items are listed within *Table 8-1: Provisions for dangerous goods carried by passengers or crew* of the ICAO Technical Instructions (or the industry equivalent Table 2.3.A within the IATA Dangerous Goods Regulations (IATA DGR)).

6.2.2 To ensure safety, some of the permitted DG items listed in the ICAO Technical Instructions Table 8-1 (or IATA DGR Table 2.3.A) require approval from the operator before the passenger may carry them aboard. The purpose of 'operator approval' is to ensure that the operator is aware of those DG and can implement necessary measures to ensure that the goods are handled properly. The process for 'operator approval' should be documented in the exposition, nominating who in the organisation may grant such approval (i.e. HOFO, PIC) and in what form that approval may be provided (i.e. written or verbal).

6.2.3 Under subsection 23(2AA) of the Act, the PIC of an aircraft must take all reasonable precautions to ensure dangerous goods are not carried on the aircraft inadvertently.

6.2.4 Dangerous goods may not be carried as cargo on an aircraft without permission from CASA under subsection 23(2) of the Act.

6.3 Dangerous goods information to passengers and crew

6.3.1 Regulation 92.025 requires that passengers be provided with dangerous goods information prior to boarding. Balloon operators must inform their passengers about dangerous goods that are forbidden to transport aboard an aircraft. Passengers must be provided with information regarding 'hidden DG' to assist them in recognising DG which they are not permitted to carry on their person or in their baggage.

6.3.2 The way this information is provided to passengers must be described in the exposition or operations manual (as applicable) and/or other appropriate manuals.

6.3.3 There are several ways to convey DG information to passengers, such as (but not limited to) pictorial pre-boarding safety cards, videos and posters shown in waiting areas or during ground transportation. If passengers are likely to be non-English speaking or English is not their first language, multilingual pre-boarding safety cards aided by a verbal briefing, is another way to help reinforce the passenger DG restrictions.

6.3.4 In addition to providing written dangerous information, operators should seek confirmation from a passenger that they are not carrying dangerous goods that are not permitted, and where appropriate, seek further confirmation about the contents of any item where there are suspicions that it may contain dangerous goods that are not permitted.

6.4 Dangerous goods manual and training

6.4.1 Under regulation 92.040, balloon transport operators (who are not intending on carrying dangerous goods as cargo) are not required to have a dangerous goods manual.

6.4.2 However, information regarding the limited DG items that are permitted to be carried by passengers or crew (as listed within ICAO Technical Instructions Table 8-1 or the industry equivalent Table 2.3.A within the IATA DGR) must be included in the operator's exposition, along with procedures for managing 'operator approval' (refer to section 6.2 of this AC).

6.4.3 Emergency response procedures for managing in-flight DG events (i.e. smoke or fire in flight) should also be included in the operator's exposition. These instructions may be simplistic and practical, including jettisoning items overboard if safe to do so and if flying over a non-populous area.

6.4.4 Under regulation 92.025 and Part 1; 2.2.1 of the ICAO Technical Instructions, dangerous goods that are required to be on board an aircraft by a law in force in Australia or for pertinent airworthiness requirements, such as life jackets, fire extinguishers and supplemental oxygen, are exempted from the dangerous goods regulations and the requirement to be included in the operator's exposition.

6.4.5 Under regulation 92.095 employees of operators engaged in balloon operations are not required to undertake dangerous goods training.

7 Sensitive areas

7.1 Sensitive areas - maps and registers

7.1.1 Under regulation 131.275 and Chapter 5 of the Part 131 MOS, the PIC of a Part 131 aircraft must carry suitable scale maps and aeronautical charts for the proposed area of operation. These may be electronic or paper maps and may also show any sensitive areas (SA) in the planned flying location. An SA is an area of land or water where there is a restriction on the operation of balloons or hot air airships that has been agreed between the landholder and an organisation or operator of the aircraft.

7.1.2 An SA is sometimes also called a sensitive zone (SZ), or previously in the balloon industry known as a prohibited zone (PZ). The restriction may be a lower limit for over-flight, a no-landing injunction or both. Some SAs may be designated for emergency landing only.

7.1.3 An SA is defined by an area drawn on a map, and/or published map or GPS coordinates. Information on the reason for the restriction if known is recommended to be included. Common reasons include livestock, biosecurity, hazardous activities, access issues, locked gates, and privacy concerns.

7.1.4 In the interests of good landholder relations pilots and operators are recommended to share local SA information.

7.1.5 AOC holders are recommended to maintain an up-to-date register of SAs in their local flying areas and make this available to their flight and ground crew. AOC holders are encouraged to inform any other balloon pilots operating in the area on the status of SAs in their local area so that a register can be kept up-to-date.

7.1.6 Electronic registers of SAs are acceptable as well as hard copies. A register should indicate the location, property boundaries, the restriction, the reasons and other relevant information.

7.1.7 CASA does not legislate private arrangements made between landholders and aircraft operators but other federal or state laws may apply.

8 Vehicle assisted deflation and ground handling

8.1 Vehicle assisted deflation

8.1.1 Although this section can apply to all operators and PIC of Part 131 aircraft, it is principally directed at balloon transport operators who may use a vehicle attached to the crown line of a large passenger carrying hot air balloon to pull down the envelope for deflation after landing.

8.1.2 All operators have a duty of care for their passengers that applies to both the launch site and landing area.

8.1.3 Vehicle assisted deflation involves attaching the free end of the crown line to the rear of a vehicle or trailer which is then driven slowly forward while the PIC activates the deflation vent from inside the basket.

8.1.4 After a hot air balloon makes a final landing in light winds, considerable force may need to be applied to the crown line of the balloon to cause the envelope to collapse in front of the basket so that the remaining air can be squeezed out. For larger passenger carrying balloons, several people may be required to apply this force. Where practical, an alternative method could involve using a vehicle to assist with the deflation.

8.1.5 It is essential that there is good communication between the driver of the vehicle and the PIC. The PIC must be able to stop the vehicle moving once the balloon is sufficiently pulled down. If not, the basket may be tipped over and dragged forward resulting in injury to the pilot or any passengers in the basket. In addition, the envelope may be damaged by excessive strain on the rigging and control lines.

8.1.6 If a balloon transport operator uses vehicle assisted deflation as a standard operating procedure, then the operator:

- is highly recommended to conduct an assessment of the potential hazards of the activity

  and

- must[8] include in their exposition the required risk mitigation procedures and precautions.

8.1.7 Balloon transport operators procedures for mitigating the risks inherent in vehicle assisted deflation are recommended to include at least the following matters, but this list is not an acceptable means of compliance and operators are to determine if additional matters are required:

- managing communications between the vehicle driver and the PIC whether using UHF radio, phone and/or signalling through a third person
- decisions on disembarking some or all passengers before commencing deflation
- ensuring that if there are any passengers still in the basket that they remain in the landing position until instructed otherwise.

8.2 Ground handling

8.2.1 This section applies to all operators of Part 131 aircraft whether operating commercially or non-commercially.

[8] See paragraph 131.195(1)(h) of CASR.

8.2.2 Operators and PIC are recommended to consider the hazards or risks to persons or property that might arise during any of the following activities:

- laying out, inflation and preparation for launch
- take-off and climb
- landing, normal deflation and pack up
- relocation of inflated balloon on the ground
- use of the handling line for hot air balloons
- use of the trail rope for gas balloons.

9 Use of electronic documents and electronic devices

9.1 Applicability

9.1.1 This guidance applies to all operators of Part 131 aircraft.

9.2 Electronic documents

9.2.1 The *Acts Interpretation Act 1901*; and *Electronic Transactions Act 1999* are the enabling legislation allowing the use of digital media to display the documentation required by the *Civil Aviation Act 1988* and any of its subordinate regulations.

9.2.2 Regulation 131.265 permits documents that are required to be carried on a flight to be in electronic form. This is intended to include the pilot's licence and medical certificate, the aircraft flight manual, and maps and charts.

Note: Electronic copies of documents carried on flights which begin or end outside Australian territory may not comply with the law of a foreign country.

9.2.3 Carriage of documents as electronic copies does not prohibit carriage of documents in hard copy. Hard copies of documents may be carried as back-up for electronic documents. Other acceptable back-up procedures are described in section 9.7 of this AC.

9.3 Portable electronic devices

9.3.1 Regulations 91.170 and 91.175 contain rules on the use of portable electronic devices (PED) and these rules apply to Part 131 aircraft.

9.3.2 Confusion can exist between the terms PED and electronic flight bag (EFB). All portable EFBs are considered PEDs, but the use of the term EFB recognises that the operator has specifically elected to use a PED for a particular flight crew member purpose.

9.4 Electronic flight bags

9.4.1 Part 131 aircraft operators and pilots are not required to use an EFB.

9.4.2 An electronic flight bag (EFB) is a portable information system which allows storing, updating, delivering and or computing digital data to support flight operations or duties. The International Civil Aviation Organization (ICAO) publishes a classification system for categorising different kinds of EFBs. [9]

9.4.3 The EFB system includes the hardware, operating system, software used, and any antennae and power sources used for the operation of the EFB.

9.4.4 Examples of software that might be used by a pilot as an aid to navigation and position identification include OzRunways, OziExplorer, OziTarget, Hot Air, Google maps and Apple maps.

[9] Refer to AC 91-17 for more information.

Note: These kinds of software are not approved to be used by pilots as the primary means of navigation as a TSO GPS would be.

9.4.5 The hardware most likely to be used for the carriage of electronic documents and used for navigation on a Part 131 aircraft would be considered a portable electronic device (PED) under the ICAO classification.

9.5 Portable electronic devices

9.5.1 A portable electronic device (PED) is a device that can display any required document information including a pilot licence, medical certificate, flight note, loading information, passenger list, maps and charts.

9.5.2 A PED may also be used to display real time navigation information and be used to record flight information including track and altitude.

9.5.3 Examples of a PED include a laptop computer, tablet smart phone or GPS tracker that is not connected to the aircraft flight system but may be temporarily mounted to facilitate easy visual access to navigation information. Such devices provide the PIC with navigation information for situational awareness.

9.5.4 The PIC of a Part 131 aircraft may choose to carry more than one PED and use one as a back-up to the principal device.

9.6 Mounting of the PED

9.6.1 A PED may be mounted in a Part 131 aircraft either attached to a permanent or temporary structure.

9.6.2 A PED that is not attached to any mounting device permanently attached to the aircraft structure is not considered part of the certified aircraft configuration and does not require airworthiness approval.

9.6.3 A mounting device that is permanently attached to the aircraft structure may require airworthiness approval for the physical mounting.

9.6.4 A mounting device that is temporarily attached to the aircraft but has no effect on the operation or structure of the aircraft does not require airworthiness approval. Any operator using a temporary mounting device should ensure that the mounting device, either when holding the PED or when empty, will not cause a hazard to persons or property during the course of normal or abnormal operations.

9.6.5 An operator that uses a PED that is temporarily attached to a permanently or temporarily mounted device should be satisfied that the PED can be secured for landing or removed and securely stowed.

9.6.6 A PED used for navigation should be mounted so that the display is readable by the PIC and any other pilot acting in command under supervision in normal operations.

9.7 Back-up and currency

9.7.1 Operators using a PED for carriage of documents or navigation should ensure that the operating system and software is kept up-to-date with the latest version. Balloon transport and commercial balloon flight training operators should nominate who is responsible for ensuring the software is up-to-date. This may be a person in the organisation that is responsible for all the PEDs or individual pilots may be responsible for their own PED.

9.7.2 Pilots conducting a specialised balloon operation, or a Part 131 recreational activity are responsible for ensuring that the operating system and software is kept up-to-date with the latest version.

9.7.3 Back-up may be another battery powered PED with the same software as the primary device or paper copies that are also kept updated as required.

9.8 Availability of documents

9.8.1 Any documents carried as electronic copies should be readily available for inspection if required.

9.8.2 Balloon transport operators and commercial balloon flying training operators should ensure that all required copies of documents are backed up on the operator's base computer system.

9.8.3 Balloon transport operators and commercial balloon flying training operators should ensure that all pilots use PEDs and systems approved by the operator and the standard operating procedures should be described in the operator's exposition or operations manual.

10 Parachute stall in hot air balloon

10.1 What is a parachute stall?

10.1.1 The parachute valve or vent panel in a hot air balloon requires sufficient internal envelope pressure to maintain it in a set position. The centralising lines usually keep the parachute valve fixed centrally within its aperture. This combination maintains a seal between the envelope vent edge and the parachute.

10.1.2 A parachute stall occurs when the parachute valve does not achieve its correct position sealing the vent and the internal pressure falls to such an extent that the seal between the envelope edge and the parachute is not maintained. The parachute vent panel now does not generate sufficient lift to support its own weight and that of the rigging, shroud line pulley and operating line.

10.1.3 In normal operations the force holding the vent panel in place is the difference (delta) between the outside air pressure above the vent panel and the pressure inside the envelope below it. Once the vent is operated, dynamic airflow around the edge of the vent panel and through the aperture opening will generate lift and suck the vent panel back into the aperture.

10.2 When can a parachute stall occur?

10.2.1 **During inflation** - During the inflation process when the envelope is not fully inflated or pressurised and the crown of the envelope is released, perhaps a little too early, the entire weight of the parachute can be held in position only by the Velcro™ tabs as the envelope rises. The envelope shape may deform, the parachute can separate from the Velcro™ tabs causing the parachute to fall back into the envelope even though the parachute valve rip line has not been pulled. A quick burn may be sufficient to 'push' the parachute valve into the required position and to prevent any further air escaping through the top of the envelope. Otherwise reattaching the Velcro™ tabs and reinflating will be required.

10.2.2 Other factors that could lead to a parachute stall during an inflation are worn Velcro™ tabs, gusty wind conditions, and any changes to the length of the rip line.

10.2.3 **On the ground after inflating and standing up, or after landing** - if the pilot is distracted and allows the balloon to cool so that the internal pressure is not maintained the parachute may fall in and the balloon begin to deflate. A quick burn may be sufficient to 'push' the parachute valve into the required position and to prevent any further air escaping through the top of the envelope. If not quick action by the ground crew on the crown line will be required to ensure the balloon does not collapse onto the burner and basket.

10.3 Parachute stall during flight

10.3.1 A parachute stall in flight can have serious consequences leading to loss of control of the balloon or an in-flight deflation.

10.3.2 Factors that may lead to a parachute stall are:

- envelope design
- excessive use of the parachute control line
- envelope distortion - high rate of climb or descent
- envelope distortion - wind shear or turbulence
- loading of the balloon.

10.3.3 **Envelope design** - Some of the older envelope designs (usually bulbous gore types, those with an overlarge parachute and those with a ripstop fabric envelope and heavier, Hyperlast™ fabric parachute) using a conventional parachute deflation system may be prone to a parachute stall.

10.3.4 **Parachute control line operation** - The manufacturer's aircraft flight manual will contain instructions and limitations on the use of the parachute control lines in flight for different parachute deflation system designs. Exceeding the manufacturer's limitations may lead to a parachute stall.

10.3.5 **High rate of climb or descent** - The manufacturer's aircraft flight manual will contain instructions on the maximum permitted rate of climb. During high climb and descent rates the envelope profile (shape) may experience deformation. Envelope distortion may place strain on the parachute control lines. The rip line must be of sufficient length and attached as specified by the manufacturer. This is to ensure there is sufficient length in the rip line to allow for envelope distortion.

10.3.6 **Wind shear or turbulence** - Envelope deformation can also occur when there is turbulence and/or wind shear. A fast rate of climb or descent in areas of wind shear could accentuate the deformation.

10.3.7 **Minimum weight loading** - Operating a balloon close to, or under the manufacturer's minimum mass/weight carrying specification, may lead to a reduction in the internal pressure of the envelope. This could increase the possibility of a parachute stall, and reduce the effectiveness of the parachute vent control lines.

10.4 In flight procedures

10.4.1 When operating the parachute control lines the PIC should look up at the parachute to ensure that when the control line has been released the parachute has reseated. If there is any doubt the PIC should burn to send a blast or series of blasts of hot air to increase the envelope pressure and reseat the parachute.

10.4.2 Some hot air balloons are fitted with a parachute/reset line. In a Kavanagh balloon smart vent system this is a red and white striped line. A light tug on this line will help extend the panel to cover the vent opening. (Kavanagh Balloons Flight Manual - Issue 1 - Revision 6 - January 2023)

10.4.3 Kavanagh balloons of 180 000 cubic feet or larger may be fitted with a Lite vent system that incorporates an all-white closing line. The closing line is used to physically ensure the vent is held closed in the event of the vent panel becoming displaced during inflation of the balloon, after resetting the vent in an intermediate landing or if severe turbulence is encountered in flight. (Kavanagh Balloons Flight Manual - Issue 1 - Revision 6 - January 2023)

10.4.4 A parachute stall can cause a rapid rate of descent, and the mouth may close completely. If this occurs, then it may be necessary to burn through the closed mouth and/or bottom panels to reduce the rate of descent and for the balloon to resume a normal shape.