FLIGHT SAFETY FOUNDATION

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Basic Aviation Risk Standard

Implementation Guidelines

Version 6, November 2016

Benefactor BARS Member Organizations

BARS Member Organizations

"The identification and mitigation of risk is a clear and direct investment in operational safety, in the lives of our employees, and in the successful future of our companies"

Jon Beatty, President and CEO, Flight Safety Foundation

BARS IMPLEMENTATION GUIDELINES

Contents

Glossary of Terms and Abbreviations

Term	Definition
Above Ground Level (AGL)	The height above ground at any point over the Earth.
Above Mean Sea Level (AMSL)	The height above a datum based on the average sea level around the Earth.
Accountability	The obligation or willingness to accept responsibility for the execution or performance of an assigned function, duty, task or action; implies being answerable (i.e. accountable) to a higher authority for ensuring such responsibility is executed or performed. May also be a performance requirement (e.g. Single-engine Accountability).
ACMI	Aircraft Crew Maintenance and Insurance.
ADF	Automatic Direction Finder.
Aerial work	A commercial aircraft operation by aeroplanes or helicopters where they are used for specialized services and does not carry passengers.
Aeronautical Decision Making (ADM)	ADM is a structured process to assist a pilot with the recognition and management of threats as they may arise during flight.
AFM	Aircraft Flight Manual.
Air Operator Certificate (AOC)	A certificate issued by a responsible regulatory authority to permit the aircraft operator to conduct certain commercial air service activities.
Air Transport Pilot Licence (ATPL)	An ATPL is the highest category of pilot licence. It is issued by a responsible regulatory authority and authorizes the user to act as Pilot-in-Command of scheduled passenger carrying services.
Airborne Collision Avoidance System (ACAS)	Also known as TCAS A system utilizing interrogations of, and replies from, airborne radar beacon transponders and provides information to the pilot: • TCAS I will provide traffic advisories to the pilot; and • TCAS II will provide traffic advisories and resolution advisories in the vertical plane to the pilot.
Aircraft movement area	That part of an aerodrome to be used for the takeoff, landing and taxiing of aircraft, consisting of the runways, taxiways and the apron(s).
Aircraft operator	Refers to an aircraft operating company used to provide aviation services.
AMO	Approved Maintenance Organization.
Approach and Landing Accident Reduction (ALAR)	A toolkit developed by the Flight Safety Foundation in conjunction with industry to assist with flight crew training for the prevention of accidents in this category.
ASI	Air Speed Indicator.

Term	Definition
Automatic Flight Control System (AFCS)	The AFCS is a system that integrates the flight director with the Autopilot systems.
Automatic Weather Observation System (AWOS)	An AWOS is a set of systems designed to autonomously collect meteorological information and transmit this information on a local frequency and/or transmit this data to another location for collection and collation.
Autopilot (AP)	A system designed to allow the aircraft to be flown without the continuous intervention of the pilot.
Auxiliary Power Unit (APU)	A small gas turbine engine which is normally used to provide air conditioning, electrical and hydraulic pressure. The APU also provides high pressure air or electrical power to start the engines. Most APUs can also be used in-flight to provide back-up electrical power in the event of an engine failure.
Baggage	Personal property of a passenger or crew member loaded on an aircraft.
Basic Aviation Risk Standard (BARS)	The Program managed by the Flight Safety Foundation on behalf of subscriber BARS Member Organizations.
BIG	BARS Implementation Guidelines.
BMO	BARS Member Organization.
Bow mounted helidecks	Helidecks mounted at the bow (forward) end of a vessel such as a pipe layer, FPSO or seismic vessel. Subject to larger PRH movement than helidecks mounted at other locations on a vessel.
BPO	BARS Program Office.
Bridging document	A document agreed to between the contracting company and the aircraft operator listing key personnel and contact details of both parties.
Cargo	Revenue and non-revenue movement of goods or property not including accompanied baggage or mail. Company material (COMAT) is considered to be cargo.
CBT	Competency Based Training.
Center of Gravity (CofG)	An imaginary point where the total weight of the aircraft appears to be concentrated. The center of gravity changes according to fuel, passenger and cargo load within various locations of the aircraft.
Certified safe working load	The manufacturer's recommended maximum weight load for a line, rope, crane or any other lifting device or component of a lifting device. The SWL is determined by dividing the minimum breaking strength (MBS) of a component by a safety factor assigned to that type and use of equipment.
Clearway	An area beyond the takeoff area clear of fixed obstacles.
CMT	Critical Maintenance Task.

Term	Definition
Cockpit Voice Recorder (CVR)	A device designed to capture and record voice and other sounds heard within the cockpit of an aircraft.
Cold weather environment	Operations on the ground in freezing conditions where surface snow, ice, standing water or slush may be ingested by the engines or freeze on engines, nacelles, airframe or engine sensor probes.
Commercial Pilot Licence (CPL)	A licence issued by the responsible regulatory authority of a country to permit the pilot to undertake flying activities for hire or reward.
Company	Refers to the individual company using the BARS to support their aviation operations.
Competent Aviation Specialist	A company designated aviation advisor or Flight Safety Foundation BARS accredited auditor.
Control	Within the context of risk management: one or more activities within a system designed to reduce the likelihood or impact of a threat or error.
Controlled Flight Into Terrain/Water (CFIT/W)	An accident where an airworthy aircraft is flown into the ground or water.
Crew Resource Management (CRM)	A training course undertaken by flight crew, often involving cabin crew, focusing on crew coordination, human factors and leadership training.
Crotch strap designs	One or more straps incorporated into the life jacket design to prevent the life jacket from riding up the body and over the head of the wearer upon entry to the water.
Dangerous goods	Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions, or which are classified according to those instructions.
Defence	Within the context of risk management: one or more activities within a system designed to mitigate the consequences of a threat or error.
Deferred Defects	Operation of the aircraft with specified unserviceable systems or equipment under certain flight conditions or operating limitations for a defined period.
Distance Measuring Equipment (DME)	A navigation aid that provides information relating to slant range distance from the aircraft to the DME aid.
Drilling Support Vessel (DSV)	A sea-going vessel (often with a large flat aft deck) which is used to support the activities of a drilling ship or drilling rig.
Duty time	A period which starts when a flight crew member or cabin crew member is required by an operator to report for or commence a duty and ends when the person is free from all duties.
Emergency Locator Transmitter (ELT)	A generic term describing equipment which broadcast distinctive signals on designated frequencies and, depending on application, may be automatically activated on impact or be manually activated.

Term	Definition
Emergency Position Indicating Radio Beacon (EPIRB)	Similar to an ELT but designed primarily for the maritime environment.
Emergency Response Plan (ERP)	A documented plan for systematic activities following an accident outlining the actions and responsible persons.
External loads	A load that is carried or extends outside the aircraft fuselage. Normally related to helicopters carrying loads on flexible sling equipment from an external hook arrangement.
Externally mounted liferafts	For helicopter operations, external liferafts are those which are mounted, attached or incorporated on the external surface or fixtures of the aircraft.
Fatigue Management Program	A data driven means of continuously monitoring and managing fatigue-related safety risks, based on scientific principles and knowledge as well as operational experience, that aims to ensure relevant personnel are performing at adequate levels of alertness.
Fixed reserve	The amount of fuel calculated using the estimated landing weight at the destination or destination alternate, to hold for a specified time (normally 30 or 45 minutes) at 1,500 ft above airfield elevation in standard conditions.
Flight Data Monitoring (FDM)	Also known as FOQA. A means of capturing and analyzing data obtained during a flight, or series of flights, to aid in the identification of undesirable operational trends.
Flight following	A system of monitoring the movement of, and providing communication to, an aircraft for the full duration of the flight.
Flight Data Recorder (FDR)	A device that records specific aircraft performance parameters. Also known as a Digital Flight Data Recorder (DFDR) or 'black box' the unit is painted bright orange in color to aid in identification.
Flight Operations Quality Assurance (FOQA)	Also known as FDM. A means of capturing and analyzing data obtained during a flight, or series of flights, to aid in the identification of undesirable trends to prevent accidents.
Flight time	The total time from the moment the airplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of a flight. For a helicopter this is from the moment the rotor blades start turning until the moment the helicopter comes to rest at the end of the flight and the rotor blades are stopped.
Floating vessels	A ship, rig or vessel either moored or unmoored on the surface of the sea subject to pitch, rolling and heaving movement. Ships, drilling rigs, platforms and barges are included.
FPSO	Floating Production Storage and Offloading units.

Term	Definition
Geophysical Operations	Aerial survey operations using either fixed wing or rotary wing aircraft with fixed or towed array sensor equipment.
Global Positioning System (GPS)	A space-based satellite navigation system providing time and location information on or near the Earth.
Go-around	A missed or baulked approach whereby the approach to land is discontinued and the aircraft climbs to a safe height in order to re-attempt the approach and landing.
Health and Usage Monitoring System (HUMS)	A system designed to perform a diagnostic and prognostic role of critical components through the gathering of data using a variety of sensors.
Helicopter Emergency Exit Lighting System (HEELS)	Independent battery operated lighting system that illuminates the crew or passenger exits when water immersion is detected. Also called Helicopter Emergency Egress System.
Helideck	A heliport located on a floating or fixed offshore structure.
Helideck Landing Officer (HLO)	A suitably trained and competent person appointed to be in control of helideck operations on the installation.
Helipad	A landing site for a helicopter not associated with a vessel or airport.
High Frequency Radio (HF)	A radio communication system utilizing frequencies within the HF radio band.
Hoist operations	Winching or lifting of personnel or equipment to or from a helicopter in the hover.
Hostile environment	An environment in which a successful emergency landing cannot be assured, or the occupants of the aircraft cannot be adequately protected from the elements, or search and rescue response/capability cannot be provided consistent with the anticipated exposure.
Hot refueling	The conduct of refueling the aircraft (or helicopter) with one or more main engines running.
HUET	Helicopter Underwater Escape Training.
Human factors	Principles which apply to aeronautical design, certification, training, operations and maintenance which seek safe interface between the human and other system components by proper consideration to human performance.
Instrument Flight Rules (IFR)	A set of regulations under which a pilot operates an aircraft in weather conditions unfavorable to flight by reference to terrain or water. En route navigation aids are used in lieu of visual references.
Instrument Landing System (ILS)	An electronic system providing precise slope and directional guidance to an aircraft conducting an approach to an aerodrome in IMC conditions.
Instrument Meteorological Conditions (IMC)	A set of weather conditions that require an aircraft to be flown solely by reference to the aircraft instruments navigated by reference to electronic navigation aids.

Term	Definition
International Airborne Geophysics Safety Association (IAGSA)	An organization primarily representing aircraft operators who perform airborne geophysical activities.
International Air Transport Association (IATA)	An international association representing the interests of commercial air carriers.
International Civil Aviation Organization (ICAO)	An international body that is a part of the United Nations which establishes Standards and Recommended Practices (SARPS). These SARPS are the basis of the aviation regulations adopted by Member States.
Last light	The end of civil twilight. See night flying definition.
LDP	Landing Decision Point.
Lifting devices	The line, swivel, shackles, D-rings, straps, nets, baskets, welded lifting lugs, bags and anything used to secure or support an external load.
Line check	A regular check flight where the pilot demonstrates knowledge and experience in normal line operations.
Long line	External Load operations utilizing a cable greater than 50ft (15.2m).
Long-term contract	Any contract using dedicated aircraft for a planned duration of greater than six months.
Lowest Safe Altitude (LSALT)	An altitude that is at least 1,000 feet above the highest terrain or obstacle within a defined area or region.
Marine Pilot Transfer (MPT)	Helicopter transfer of marine pilots to or from a ship/ vessel. Can involve either landing on the vessel or winching of the pilot to or from the vessel.
Medevac	Medical Evacuation (Medevac) is a specific flight for the purpose of retrieving a patient in medical distress from injury or illness.
METS	Modular Egress Training Simulator.
Minimum Equipment List (MEL)	A list which provides for the operation of aircraft (subject to specified conditions, with particular equipment inoperative) prepared by an operator in compliance with, or more restrictive than, the Master MEL established for the aircraft type.
Missed Approach Point (MAP)	During the conduct of an instrument approach, the MAP is the latest point at which a pilot must conduct a missed approach if they do not become visual with reference to the aerodrome.
NDB	Non-Directional Beacon.
Night flying	Flight operations during the hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate regulatory authority.

Term	Definition
Night Vision Goggles	A binocular appliance that amplifies ambient light and is worn by flight crew. The NVGs enhance the flight crew's ability to maintain visual reference to the surface at night.
Night Vision Imaging System	A system that integrates all elements necessary to successfully and safely operate a helicopter with NVGs. The system includes NVGs, NVIS compatible lighting and other helicopter components.
Night Visual Flight Rules (NVFR)	A set of regulations under which a pilot operates an aircraft in weather conditions favorable to flight by reference to terrain or water at night.
Non-hostile environment	An environment in which a successful emergency landing can be reasonably assured, the occupants of the aircraft can be adequately protected from the elements, and search and rescue response/capability can be provided consistent with the anticipated exposure.
OEM	Original Equipment Manufacturer.
Official sunset	The time that the surface of the sun disappears below the horizon.
Offshore	Flight operations to a floating rig, platform or vessel by a helicopter.
Offshore only alternate diversion	An operational practice of declaring as an alternate, a helideck which is in an offshore location and not within range of an onshore helideck.
One Engine Inoperative (OEI)	In relation to a multi-engine aircraft, the failure of an engine results in a thrust imbalance with performance degradation.
Operations Manual (OM)	A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.
PAPI	Precision Approach Path Indicator.
Passenger Control Officer (PCO)	A trained and designated person responsible for the safe movement of passengers between the aircraft/helicopter and terminal/safe area.
Pavement Classification Number (PCN)	A number expressing the bearing strength of a pavement for unrestricted operations.
Performance Class 1	Operations with performance such that, in the event of a critical engine failure, a helicopter is able to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the takeoff decision point (TDP) or after passing the landing decision point (LDP), in which case the helicopter must be able to land within the rejected takeoff or landing area.
Performance Class 2	Operations with performance such that, in the event of a critical engine failure, a helicopter is able to safely continue the flight to an appropriate landing area, unless the failure occurs early during the takeoff maneuvers or late in the landing maneuvers, in which case a forced landing may be required.

Term	Definition
Performance Class 3	Operations with performance such that, in the event of an engine failure at any time during the flight, a forced landing will be required.
Personal Locator Beacon (PLB)	Similar in role and function to the ELT and EPIRB, the PLB is a small, hand-held emergency beacon normally carried in either a flight crew vest or otherwise on the person.
Personal Protective Equipment (PPE)	Equipment worn or carried by the person to provide protection from natural or man-made environmental or other factors.
Pilot-in-Command (PIC)	The pilot designated by the aircraft operator as being in command and charged with the safe conduct of the flight.
POH	Pilot Operating Handbook.
Proficiency check	A regular check flight where the pilot demonstrates competence in normal, non-normal and emergency procedures.
Pulse Lights	A modification for existing landing light/taxi light systems for aircraft which varies the intensity of the lights in a predetermined sequence to improve collision and bird avoidance.
Quality assurance	A set of activities that are carried out to set standards to monitor and improve performance so that the service or product provided will satisfy stated or implied needs.
Responsible regulatory authority	The authority of a country designated to manage and oversee compliance and safety of civil aviation.
Risk assessment	A systematic and documented process of identifying risks and mitigating actions associated with a particular activity.
Rotor Running Load/ Unload	Loading or unloading of passengers or cargo/baggage with the helicopter main engines operating.
Route check	A regular check flight where the pilot demonstrates knowledge and experience in an area or route and its airports.
Safety Management System (SMS)	A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.
Search and Rescue (SAR)	The search for and provision of aid to people who are in distress or imminent danger.
Seat belt extensions	Any method of extending the physical length of the seat belt.
Shackles	A ring or device used to connect the load (line) to the hook (helicopter).
Short line	External Load operations utilizing a cable less than 50ft (15.2m) and shorter than the distance from the hook to tail rotor.

Term	Definition
Special VFR Procedures	Meteorological conditions that are less than those required for basic VFR flight in controlled airspace and in which some aircraft are permitted flight under visual flight rules.
Standard	Standard means the Basic Aviation Risk Standard as issued by the Flight Safety Foundation.
Stop way	An area beyond the takeoff runway able to support the airplane during a rejected takeoff without causing structural damage to the airplane, and designated by the airport authority for use in decelerating the airplane during a rejected takeoff.
Stretcher carrying operations	The installation of a permanent or temporary stretcher to the aircraft by an approved means to facilitate the carriage of a non-ambulatory passenger.
Strobe Lights	One or more flashing lights in aviation red or aviation white fitted to the aircraft as part of the aircraft navigation light system.
Sub Chartering (Cross Hiring)	The temporary use by the aircraft operator, of aircraft and/or crew from a different AOC holder to that which holds a contract for the provision of aviation services. Other terms such as Wet Leasing, ACMI are included in this definition.
Supplementary Type Certificate (STC)	A certificate issue approving the modification to an aircraft.
TDP	Takeoff Decision Point.
Terrain Awareness Warning System (TAWS)	A system designed to warn a flight crew when their flight path may take them into proximity with terrain. Air traffic control systems may be equipped with TAWS to warn the controller when an aircraft's flight path may take it into proximity with terrain.
Traffic Collision Avoidance System (TCAS)	Also known as ACAS. A system utilizing interrogations of, and replies from, airborne radar beacon transponders and provides information to the pilot: • TCAS I will provide traffic advisories to the pilot; and • TCAS II will provide traffic advisories and resolution advisories in the vertical plane to the pilot.
Threat	Source of risk that must be managed to maintain the margin of safety.
Threat and Error Management (TEM)	A training program designed to educate students on aviation related threats and errors and associated risk mitigation strategies.
Technical Standards Order (TSO)	A minimum prescribed standard for the performance and manufacture of parts and materials used in aircraft.
Ultra High Frequency (UHF)	A radio band used for two-way communications. Limited to line-or-sight communications.
Upper Torso restraint	Aircraft seatbelts incorporating shoulder straps. Can be either a three point, four point or five point harnesses.

Term	Definition
Variable reserve	An amount of fuel carried to account for unforeseen factors that could have an influence on the fuel consumption to the destination aerodrome.
Variations	Any variation to this Standard is at the discretion of each company. It is recommended that each variation be assessed to demonstrate that the risks associated with the variation are tolerable and justify safe continuation of operations.
Vertical Speed Indicator (VSI)	A device that measures the rate of climb or descent of an aircraft.
Very High Frequency (VHF)	A radio band used for two-way communications. Limited to line-of-sight communications.
VHF Omni-directional Range (VOR)	A navigation system utilized by aircraft. Limited to line-of-sight reception.
Vibration Health Monitoring System (VHM)	A system designed to monitor and identify vibration trends that could assist in predicting the onset of mechanical failure.
Visual Flight Rules (VFR)	A set of regulations under which a pilot operates an aircraft in weather conditions favorable to flight by reference to terrain or water.
Visual Meteorological Conditions (VMC)	A set of conditions where a minimum visual range, distance from cloud and height above ground can be maintained.
V_{MCA}	Minimum Control Speed in the takeoff configuration.
V_{NE}	Never exceed speed.
V_S	Stall speed or minimum steady flight speed for which the aircraft is still controllable.
V_{SSE}	Safe single-engine speed.
V_Y	Best rate of climb speed.
V_{YSE}	Best rate of climb speed with a single operating engine and a twin engined aeroplane.
V_1	Decision speed on takeoff.
WSPS	Wire Strike Protection System.

Introduction

Purpose

The Flight Safety Foundation (FSF) Basic Aviation Risk Standard (BARS) is a safety standard aimed at contracted aviation operations.

The BARS Implementation Guidelines complement the Standard by providing additional context to the controls and defences presented against each threat. It assists resource companies (‘company’), aircraft operators and BARS Registered Audit companies to understand what evidence is required to validate the control and defence design and operating effectiveness. These guidelines will assist both the Operator and the company to implement the BAR Standard.

All national and international regulations pertaining to aviation operations must always be followed. The information contained in the BAR Standard and this document is intended to supplement those requirements.

Document Structure

This document covers threats and controls applicable to all aircraft operations and addresses the role specific requirements applicable to certain aviation activities, such as external load and medivac.

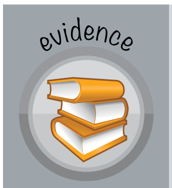
These guidelines use the same risk-based format and same sections and control numbering as the BARS for ease of cross-referencing. The information provided for every BARS Control is presented in this document in the following format:

Basic Aviation Risk Standard (BARS) Control Title

BARS Audit Checklist reference

Details the control as written in the BAR Standard.

Information to provide further context and background to the control, threat or defence that is being addressed by the subsection.



Example evidence is provided for guidance, it is not prescriptive nor limiting.
It relates the expected manner in which the issue could be addressed by the aircraft operator (through drafting of procedures, etc.)
It is provided in order to assist the BARS Auditor and Aircraft Operator in assessing whether or not the control or defence requirements have been adequately addressed or implemented.

References presented as a ‘quotation’ are intended to highlight those aspects of particular relevance to resource companies (‘company’).

Change bars have been utilized to indicate material changes to the content or intent of the Implementation Guidelines.

Variances

Any variance to the use of the BAR Standard is at the discretion of the company in consultation with the aircraft operator. It is recommended that any variance raised be risk-assessed to demonstrate that the risks are tolerable and warrant the safe continuation of operations. A schematic of the process is outlined in Figure 1.

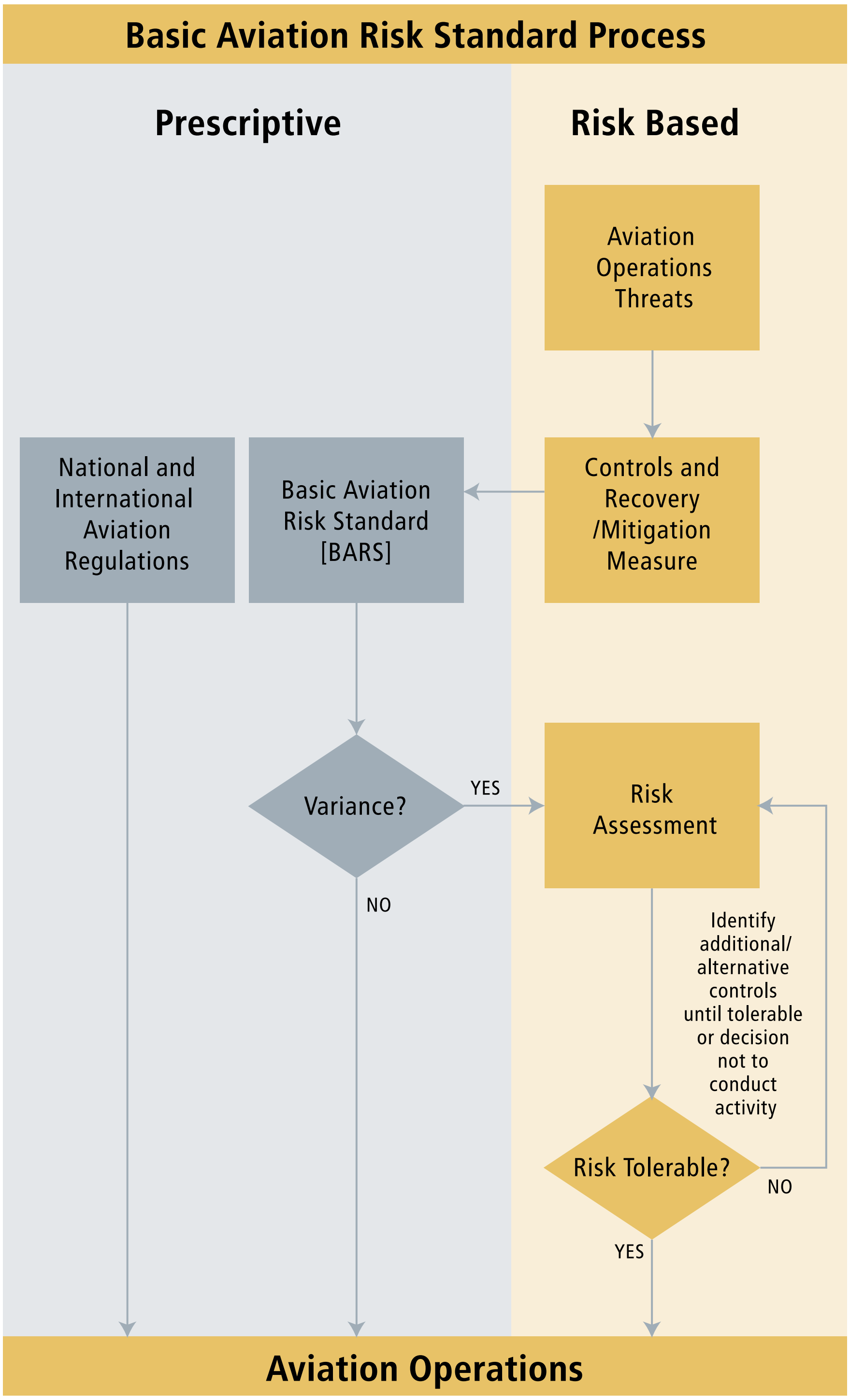


Figure 1: BARS Process.

BARS Audit and Company Operational Review

Two-dimensional Approach to Aviation Assurance

To reinforce the difference between a BARS Audit and an Operational Review, an example of a two-dimensional approach to aviation risk management and assurance is presented in Figure 2.

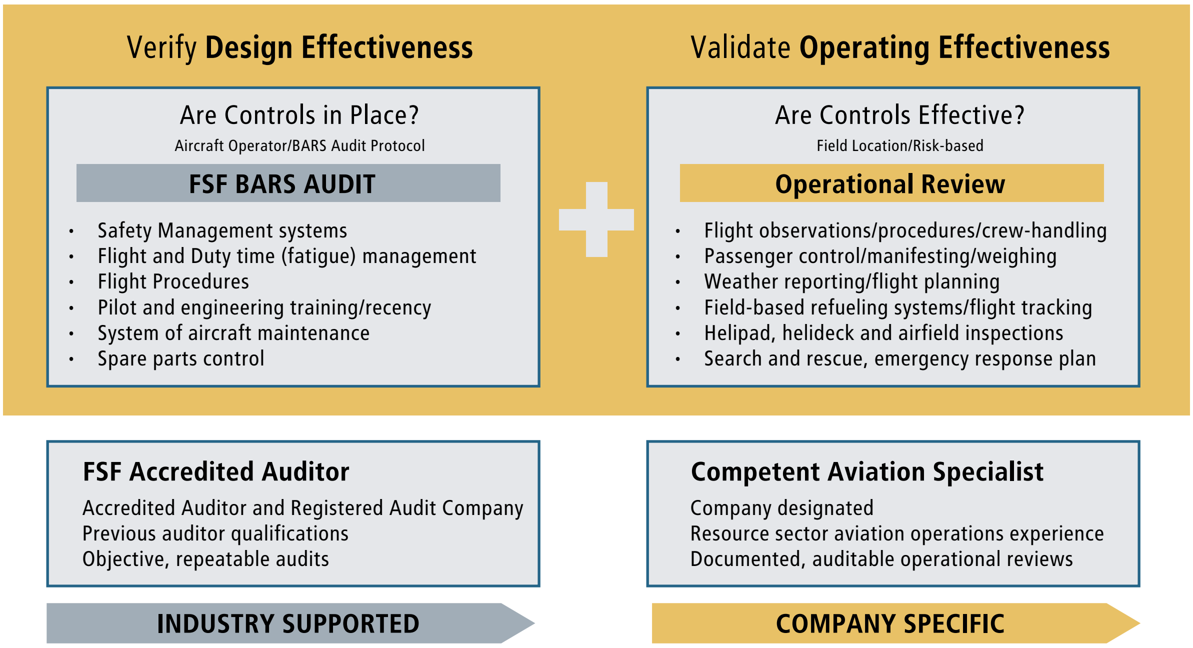


Figure 2: Two-dimensional approach to aviation risk management

The FSF BARS Audit ascertains aviation risk control 'design effectiveness'. It is an objective and transparent audit of an aircraft operator using FSF trained and accredited auditors and a defined audit protocol mapped to the BAR Standard. This audit covers common elements of an aircraft operator audit relevant to all parties with the aim of providing one deep-dive audit to one standard for all interested parties to base their approval on.

A second and equally important aspect is the Operational Review which assesses aviation risk control effectiveness. More specifically, that the aircraft operator is conducting their business in the manner that the BARS Audit identified them as being capable of performing. It is a risk-based review focusing on company specific activities and is based on a minimum of five critical controls:

1. Personnel – Pilots meet all licence and experience requirements and are fit for work.
2. Aircraft – appropriate for the activity and are suitably equipped.
3. Fuel – acceptable quality and quantity for the activity.
4. Weather monitoring – appropriate for the activity and environment.
5. Infrastructure – acceptable design and operating conditions for takeoff and landing.

More critical controls can be added depending on the risks that are identified for control during the pre-start operational risk assessment.

The Operational Review would not normally repeat the management/Head Office portion that is covered by a BARS Audit, as it has a risk-based focus on relevant threats and their associated controls for a particular aviation activity.

The following guidance provides further assistance for a BMO to determine when an Operational Review should be considered:

Consider Operational Review in addition to a BARS Audit		
Activity	**Detail**	**Frequency**
Long-term helicopter or aeroplane activity in hostile and/or poor regulatory environment.	All contracts greater than six months in areas that are assessed as not a mature and stable regulatory environment and/or operating into areas assessed as benign or non-hostile.	Start-up, annual thereafter.
Company owned and operated infrastructure supporting aviation.	Company aerodromes, helidecks, production helipads and all long-term operational bases.	Start-up, annual thereafter.
High risk helicopter role-specific activity > three months.	Exploration, seismic, heli-rig, external load activities.	Start-up, annual thereafter.
Offshore drilling and/or seismic campaign > three months.	Include helideck review and associated procedures.	Start-up, annual thereafter.
Geographic dispersion of an aircraft provider fleet or flight operations centers.	Operational sites that maybe permanently co-located from Chief Pilot and Chief Engineer.	Annual.
Current aircraft operator experiences a significant incident related to operations.	Aircraft accident, ground handling incident, or any incident that might have direct relevance on BMO's activities.	As required.
Current aircraft operator experiences material change to organization.	Senior management changes, change in ownership, change in base location, re-fleet or other significant management of change process.	As required.

For those BMOs who do not have internal aviation specialists, a list of BARS registered audit companies who offer specialist advice can be obtained from the BARS website.

BMOs are encouraged to share their Operational Reviews with the BPO on a voluntary basis to 'close-the-loop' and provide an opportunity to incorporate review findings back into the BARS audit process, to strengthen the Program even further.

For activities such as ad-hoc charter, short-term use of aircraft and ongoing aerial work (no passengers) in a non-hostile environment, an Operational Review in addition to a BARS audit may not be required based on the output of a risk assessment.

BARS Accredited Audit

A BARS audit using registered audit companies and accredited auditors provides an audit of the operations and technical management systems of an aviation operator. It is a deep-dive audit with the objective of clearly articulating and verifying what procedures, processes and systems the aircraft operator has in place.

Company Specific Operational Review

An Operational Review is company specific, and entirely at the discretion of the company using in-house or contracted specialists and is not always required. The Operational Review does not repeat the management systems portion of the BARS audit, but is a risk-based assessment of the relevant threats to a particular aviation activity. The Operational Review is conducted as a field-based activity to ensure that standards and practices reviewed during the BARS audit are also embedded into actual operations supporting the resource sector.

Figure 3: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and

Threat	Controls	
Threat 2.0: Runway Excursions	Airfield Design and Helipad Design Airfield Inspections	Landing Site Assessments Balanced Field Length
Threat 3.0: Fuel Exhaustion	Fuel Check Weather Data	Flight Plan IFR Fuel Plan
Threat 4.0: Fuel Contamination	Fuel Testing Fuel Filtration	Fuel Sampling Fuel Storage
Threat 5.0: Controlled Flight Into Terrain (CFIT)	Night/IFR – Two Crew – Aircraft – Flight Planning – Simulator Training	Night/IFR – Approach/Landing – Autopilot Special VFR Procedures Stabilized Approaches
Threat 6.0: Loss of Control – In-flight (LOC-I)	Automation Policy Multi-crew Operations	CRM/ADM Training Flight Data Monitoring
Threat 7.0: Incorrect Loading	Passenger Weight Cargo Weight and Loading Load and Trim Calculations	Manifest Dangerous Goods Cargo
Threat 8.0: Collision On Ground	Passenger Terminal Area Designated Freight Area Passenger Control	Ground Procedures Pilot at Controls Parking Apron
Threat 9.0: Collision In Air	Cruising Altitudes Radar Controlled Airspace	Airfield Bird Control TCAS
Threat 10.0: Structural or Mechanical Failure	Single-engine Aircraft Multi-engine Aircraft Supply of Spares Hangar Facilities	Helicopter Vibration Monitoring Engine Trend Monitoring Minimum Equipment List (MEL)
Threat 11.0: Weather	Adverse Weather Policy Thunderstorm Avoidance	Weather Radar Wind Shear Training
Threat 12.0: Medical Evacuation	Securing Equipment Weight and Balance Medical Transfers Communications Risk Assessment	Equipment Documentation Equipment Inspection Schedule Provision of Oxygen Flight Crew Qualifications, Experience and Recency

Common Controls:
All Threats 1.0

- 1.1: Approved Aircraft Operator
- 1.2: Flight Crew Qualification, Experience and Recency
- 1.3: Flight Crew Check and Training
- 1.4: Maintenance Personnel Qualification
- 1.5: Maintenance Training
- 1.6: Basic Aircraft Equipment Fit
- 1.7: Drug and Alcohol Policy
- 1.8: Flight Time Limits
- 1.9: Flight Crew Duty Time
- 1.10: Maintenance Duty Time
- 1.11: Aircraft Operator Safety Management System
- 1.12: Accident and Incident Notification
- 1.13: Operational Risk Assessment
- 1.14: Sub-chartering Aircraft

Recovery Measures.

- Destination Weather Reporting
- Slope Guidance

- VFR Fuel Plan
- Hot Refueling

- Drummed Fuel

- Go-around Procedures
- Flight Data Monitoring
- Multi-crew Operations
- CRM/ADM Training
- TAWS

- Line Operations Safety Audit (LOSA)

- Passenger Briefing
- Multi-language Briefing

- Perimeter Fence
- Airfield Control

- High Intensity Strobe Lights

- Aural Cabin Pressure Warning System
- Critical Maintenance Tasks (CMTs) and Independent Inspections

- VFR Minimum Requirements
- Cold Weather Training

- Cleaning of Aircraft Post Evacuation Mission
- Arrival at Destination

Aircraft Accident

Recovery Measures:

Aircraft Certification Standards

Emergency Response Plan

Emergency Locator Transmitter

Satellite Flight Following

Flight Following

Survival Kit

Flight Crew PLB

First-Aid Kit

Passenger Dress Requirements

Cockpit Voice Recorder (CVR)/
Flight Data Recorder (FDR)

Upper Torso Restraint

Limitations in Sideways Seating

Crash Boxes

Rescue Firefighting

Insurance

BARS BASIC AVIATION RISK STANDARD

1.0: All Threats: Common Controls

Common controls that apply to all threats outlined in the BAR Standard.

Threats to aviation must be managed to provide the necessary assurance for continued safe operations at all times.

A risk-based standard allows the identification of critical controls that are intended to prevent an incident from occurring. Those controls are outlined in the BAR Standard.

Some controls are specific to a single threat. However, there are a number of controls required to be effective against all threats encountered in resource sector aviation operations. These common controls are discussed further in this section.

1.1: Approved Aircraft Operator

Use only licenced aircraft operators who have been approved for use by a Competent Aviation Specialist.

An aircraft operator must be in possession of a valid Air Operator Certificate (AOC) or equivalent document issued by the responsible regulatory authority of the state of the aircraft operator.

The issue of an AOC will require the aircraft operator to demonstrate an adequate management organization structure, method of control and supervision of flight operations, training programs, ground handling and maintenance arrangements appropriate for the operations specified.

The operator must have clearly defined roles and responsibilities for the following positions, or their equivalent:

- Head of Flight Operations; and
- Head of Check and Training.

Where required by the State of the aircraft operator, the persons appointed to these key positions must be approved by the responsible regulatory authority.

evidence

The aircraft operator must have documented job descriptions for the key positions including roles and responsibilities, reporting lines and interfaces.

Where applicable, the responsible regulatory authority should provide the aircraft operator with a copy of any document approving a person to a key position.

The aircraft operator has a person appointed and approved in all key positions, and the organizational structure reflects the accountabilities and level of responsibility assigned to the positions.

1.2: Flight Crew Qualifications, Experience and Recency

Flight crew must meet the requirements listed in Appendix 1 of the BAR Standard.

As an alternative to the strict hours compliance requirements expressed in Appendix 1, a number of Competency Based Training (CBT) pathways have been approved for use under the BARS Program. The CBT provides an alternate pathway to pilot qualification and experience requirements, while still providing an equivalent level of safety. Use of the CBT pathway is subject to client company approval and review of the program by the Competent Aviation Specialist.

FLT 1.05.01
FLT 1.05.03
FLT 2.01.01
FLT 2.08.01
FLT 2.08.02
FLT 2.08.03
FLT 2.08.04
FLT 2.08.05
FLT 2.08.06
FLT 2.08.07
FLT 2.08.08
FLT 2.08.09
FLT 2.08.10
FLT 2.08.11
FLT 2.08.12
FLT 2.08.13

Minimum Qualifications

The aircraft operator must have a system that ensures all flight crew assigned to participating BARS Member Organization flights have a current licence that meets both the minimum requirements defined by the responsible regulatory authority and those specified in Appendix 1 of the BAR Standard.

See section C for advice on constructing a framework for CBT.

The aircraft operator must maintain records of pilot qualifications, complete with copies of flight crew licences and summaries of experience and type ratings. A documented control mechanism must be in place to ensure that pilots are qualified and experienced to meet the task requirements when assigned to flights.

Information contained on files maintained by the aircraft operator for each individual flight crew should provide a record of flight crew qualifications.

Minimum Experience

The aircraft operator must have defined selection criteria and procedures for all flight crew appointments, including full-time, free-lance/part-time and casual flight crew. This should include minimum licensing and flying experience criteria.

Key to resource sector operations is the requirement for flight crew to have 12-months experience in topographical areas similar to where the activity is being conducted. The duration of 12-months is aimed at ensuring all seasonal variations are experienced by flight crew enhancing their decision-making process. Examples of specific topographical areas include PNG, South American Andes, Indonesia, Canadian and Russian Federation arctic operations, hostile offshore environments and remote African environments. See Page 3 of the BAR Standard for a definition of hostile and non-hostile environments.

The aircraft operator must document minimum experience requirements for all flight crew positions that reflect both the minimum standard for the roles as defined in the BAR Standard and the requirements of the responsible regulatory authority. Where the BAR Standard is not used for all operations, there should be a statement indicating that crew who do not meet the BARS requirements are excluded from BARS operations until the minimum qualification and experience requirements are met.

Information contained on pilot files and rostering records maintained by the aircraft operator should show that the stated BARS requirements have been met or that the individual is excluded from BARS operations until meeting the minimum qualification and experience requirements.

Minimum Recency

The aircraft operator must not assign a Pilot-in-Command or a co-pilot as operating flight crew on a flight unless they meet the minimum pilot recency requirements of either the BARS or the responsible regulatory authority (whichever is the more stringent).

The aircraft operator must have a records management system for recording and monitoring all relevant flight crew recency parameters including, but not limited to:

- Day and night takeoffs and landings;
- Flight time;
- Instrument flight time;
- Instrument approaches; and
- Requirements of the aircraft operators training and checking program.

The rationale behind minimum recency requirements rests largely on assuring flight crew manipulative skills continue to be of the required standard. Variances to recency skills may be considered when simulator training can be demonstrated as an effective alternative and endorsed by the applicable regulatory authority.

The aircraft operator must document the method for tracking recency requirements. Manual, paper-based systems are acceptable however computer programs that more accurately track the varying limits are the preferred option. Where BAR Standard is not used for all operations, a statement must be included indicating that crew who do not meet BARS recency requirements are excluded from BARS operations until such time as these requirements are met.

A paper-based or electronic recency tracking system should be in place with the aircraft operator. Associated records should confirm that pilots are maintaining the required recency and that the rostering system has attended to upcoming check and training requirements prior to expiry. Flight crew files and rostering records should confirm appropriate implementation.

1.3: Flight Crew Check and Training

FLT 1.05.02
FLT 2.03.02
FLT 2.03.16
FLT 2.03.19

Flight crew must receive annual training to the standards of the appropriate civil aviation authorities and two flight checks annually (or every six months for long-term contracted operations). The flight checks must include an annual instrument rating renewal (where applicable)/proficiency or base check (non-revenue) and a route check (revenue-flight permissible).

Where distinct climatic seasons such as snow/ice winter conditions are experienced, training related to the seasonal change is recommended. Before commencing flight duties in a new location on long-term contract, all flight crew must receive a documented line check that includes orientation of local procedures and environment.

A check and training program must be provided to ensure that flight crew are trained prior to commencing and while engaged in activities supporting BARS Member Organizations. The program is to ensure individual competencies and the aircraft operator's flight standards are being maintained.

Flight Check and Training – Personnel

Where the applicable regulatory authority has provided the aircraft operator with delegated authority to conduct check and training, the aircraft operator must ensure that selection of personnel is merit-based and demonstrate the consistent application of standards, ethics and objectiveness.

evidence

The aircraft operator must document the minimum experience requirements and selection criteria applicable for positions within the aircraft operator's check and training program. Records should confirm that the documented requirements have been applied.

The aircraft operator's check and training captains must:

- Receive initial and periodic training evaluations;
- Be approved by the responsible regulatory authority; and
- Follow established check and training criteria.

Where possible the crew providing the training should be independent (different) to those conducting the checking of the pilots.

evidence

Details of the aircraft operator's check and training program should be published in the Operations Manual and follow established criteria. The syllabuses and procedures for initial training and approval and the processes for conducting periodic training, evaluation and ongoing standardization of check and training pilots should also be documented. Check and training captains' records should confirm that the documented requirements have been applied.

Flight Crew Check and Training – Program

The aircraft operator must not assign a Pilot-in-Command or a co-pilot as an operating crew member of a flight unless that person has met all applicable requirements of the aircraft operator's training and checking program, and has been certified by a check pilot as being competent to act as an operating crew member. Such requirements must be applied to flight crew likely to be assigned to a BARS Member Organization flight regardless of their employment basis (e.g. full-time, free-lance, part-time or casual).

Courtesy: Karratha Flying Services

Ground Training

The operator's flight crew ground training program must cover all the aspects of normal operations and include:

- Altitude and terrain awareness, including items highlighted in the FSF ALAR Briefing Note 3.2 – Altitude Deviations and Briefing Note 5.2 – Terrain;
- Aircraft performance, including the requirements of the responsible regulatory authority; Original Equipment Manufacturer (OEM) and the aircraft operator's Standard Operating Procedures (SOPs). Address items such as how the performance is calculated and the applicable procedural controls that apply (e.g. obstacle clearance calculations, runway performance, helicopter in-ground/out-of-ground effect performance, etc.);
- Rejected takeoff, including runway performance theory to provide an increased understanding of V speeds and how Balanced Field Length/Rejected Takeoff criteria are determined;
- All instrument approaches used by the aircraft operator, including instrument approach aids and procedures that are in use in the aircraft operator's area of operation;
- English Language Proficiency for flight crew where it is required by the applicable regulatory authority and where international operations are being conducted; and
- For helicopter operators an understanding of Performance Class 1, Class 2, Class 2 Enhanced and Class 3 performance with Category A and B certified helicopters. An understanding of flyway performance for onshore operations and profiles for offshore operations.

evidence

A training syllabus for these topics should be published in the Operations Manual and follow established check and training criteria. The syllabus for initial training and processes for conducting periodic training and ongoing evaluation should also be documented. Pilot training records should confirm that these training requirements have been applied in the induction training of new pilots and where applicable, in the ongoing evaluation of pilot competency.

Flight Training

The aircraft operator's check and training program must provide initial and recurrent training and a minimum of one flight check every six months. These flight checks, at a minimum, should include a combination of a proficiency check (non-revenue) and a route check (revenue-flight permissible).

evidence

Details of the aircraft operator's check and training program should be published in the Operations Manual and follow established check and training criteria. The program should cover requirements and procedures for initial training and approval and the processes for conducting recurrent training and checking. Pilot training records should confirm that the requirements of the training program have been applied in the induction training of new pilots and the ongoing evaluation of pilot competency.

Flight Crew Check and Training – Procedures

Documentation of the aircraft operator's check and training program must cover all requirements and procedures relating to pilot training and ongoing evaluation of pilot competency.

The aircraft operator's documentation must provide details of all ground training and flight training that are relevant to the operations. The documentation must also provide adequate guidance to check and training staff regarding the acceptable standards for flight crew performance along with the procedures for dealing with unsatisfactory flight crew performance.

A system should be established by the aircraft operator to ensure that records are maintained of all training and checking sequences that flight crew have been subject to (both ground and flight training) and the associated outcomes.

evidence

Details of the aircraft operator's check and training program should be published in the Operations Manual and follow established check and training criteria. The syllabus and procedures for conducting initial and recurrent ground and flight training, along with guidance regarding the acceptable standards for flight crew performance, and policies and procedures for dealing with unsatisfactory performance should be documented.

Pilot training records must be available and confirm that the documented requirements of the aircraft operator's training and checking program have been applied consistently in the training and ongoing evaluation of flight crew performance.

Flight Crew Check and Training – Synthetic Flight Training

If the aircraft operator utilizes flight simulators and training devices in its training and checking program, it must ensure that they are configured to reflect the applicable aircraft type(s) which have been approved by the responsible regulatory authority.

evidence

Where the aircraft operator's check and training program utilizes flight simulators, the Operations Manual must contain documented procedures for their use. The documented program should follow established criteria and address the use of simulators in the conduct of initial and recurrent check and training.

Pilot training records must confirm that these requirements have been applied.

The Operator must be able to demonstrate the regulatory approval of the flight training device.

MNT 1.01.03

1.4: Maintenance Personnel Qualification

Maintenance personnel must meet the experience requirements listed in Appendix 1 of the BAR Standard.

The aircraft operator and/or approved maintenance organization must ensure its Maintenance Controller, Chief Engineer and all other line maintenance personnel meet the minimum qualification and experience requirements prescribed by the responsible regulatory authority and the BAR Standard.

Oversight of approved maintenance organizations is critical for ensuring standards and expectations of the aircraft operator are being met.

evidence

The aircraft operator and/or approved maintenance organization must document the minimum qualification and experience requirements and selection criteria for all technical positions within the maintenance organization.

Records should confirm that these requirements have been applied and where required, that the responsible regulatory authority has approved the individual appointed to a position.

1.5: Maintenance Training

The aircraft operator or approved maintenance organization must develop a program for the training of maintenance personnel at least every three years. The training must include human factors in maintenance and company maintenance documentation and procedures and where appropriate include technical components for aircraft and systems being maintained.

MNT 1.04.01
MNT 1.04.02
MNT 1.04.04
MNT 1.04.05
MNT 1.04.06
MNT 1.04.07
MNT 1.04.08

The aircraft operator and/or approved maintenance organization must ensure that initial and recurrent maintenance training is provided to all applicable maintenance personnel. The training program must include:

- Aircraft specific training when new equipment is introduced;
- Human factors in maintenance;
- All relevant maintenance documentation including engineering procedures;
- Technical components for aircraft and systems being maintained; and
- Minimum Equipment List (MEL) training.

evidence

The training syllabus and/or details of training arrangements for these topics should be published in the relevant maintenance manual.

Records should confirm staff qualifications and experience and dates on which initial and recurrent training requirements were completed.

Personnel training records must record details of dates on which staff qualifications, training and/or experience lapse.

Where maintenance is outsourced, the aircraft operator must provide information on how they ensure that the approved maintenance organization is completing maintenance activities to the aircraft operator's required standard. Audit records and maintenance documentation should at a minimum provide evidence of the work being performed and the oversight mechanisms in place.

1.6: Basic Aircraft Equipment Fit

Aircraft basic equipment fit must meet the requirements listed in Appendix 2 of the BAR Standard.

MNT 3.01.01

When operating for a BARS Member Organization, the aircraft operator must ensure that aircraft are fitted or equipped in accordance with Appendix 2 of the BAR Standard, in addition to the minimum equipment requirements set by the responsible regulatory authority.

evidence

The aircraft operator must provide documentation that acknowledges the requirements for the fitment of the minimum equipment listed in Appendix 2 of the BAR Standard for all relevant aircraft and operations.

FLT 1.02.13

1.7: Drug and Alcohol Policy

The aircraft operator must have a Drug and Alcohol Policy which meets all requirements of the responsible regulatory authority. Where no such regulatory requirements exist the operator must at a minimum meet the requirements of the contracting company.

Aircraft operators must have a documented Drug and Alcohol policy that clearly articulates the minimum acceptable level of compliance. Guidance regarding the effects of readily available medications and drugs should be provided.

evidence

Details of the aircraft operator's Drug and Alcohol Policy and the associated drug and alcohol management plan (where required by the applicable regulatory authority), should be published in the Operations Manual or other applicable manual. The policy and plan must cover all persons involved in safety sensitive aviation activities.

Records should confirm that applicable requirements of the drug and alcohol monitoring program are being routinely applied for persons involved in safety sensitive aviation activities.

FLT 1.04.01
FLT 1.04.02
FLT 1.04.03
FLT 1.04.04
FLT 1.05.04

1.8: Flight Time Limits

Unless local regulatory requirements are more stringent, the flight time limits detailed in the BAR Standard are to be applied.

Single-pilot operation	Two-pilot operation
8 hours daily flight time	10 hours daily flight time
40 hours in any 7 day consecutive period	45 hours in any 7 day consecutive period
100 hours in any 28 day consecutive period	120 hours in any 28 day consecutive period
1000 hours in any 365 day consecutive period	1200 hours in any 365 day consecutive period

Resource sector aviation operations may result in-flight crew conducting tours of duty rotational in nature and extended in duration. In such circumstances, any flying undertaken during the break time away from the touring location must be recorded and the aircraft operator must be notified.

Details of the aircraft operator's fatigue management program should be published in the Operations Manual and be either specifically approved by the responsible regulatory authority, or be in compliance with that authority's fatigue management regulations. The documented program should cover daily, weekly, monthly and annual flight time limits.

The aircraft operator should include details in their Operations Manual of the system to be used for recording and tracking flight and duty times as well as rest periods. While manual, paper based systems are acceptable, computer programs that comprehensively track the varying limits and predict exceedances are the preferred option.

Flight and duty time records must confirm compliance with all requirements of the flight time limits that are applicable the aircraft operator's flight time management program. The flight and duty time records that are maintained should be consistent with information provided in other documents such as aircraft flight records.

1.9: Flight Crew Duty Time

FLT 1.04.02
FLT 1.04.03
FLT 1.04.04

A duty day must not exceed 14 hours and where 12 hours has been exceeded, this must be followed by a rest period of a minimum of ten hours. Crews on rotational assignments that arrive following overnight travel, or travel exceeding four time zone changes, must not be rostered for flying duties until the minimum ten hour rest period is met.

Regulatory approved fatigue management programs may be used in lieu of the above limits when endorsed by a Competent Aviation Specialist.

The aircraft operator should include details in their Operations Manual regarding the system to be used for recording and tracking duty times as well as rest periods. While manual, paper based systems are acceptable, computer programs that comprehensively track the varying limits and predict exceedances are readily available and are preferable.

1.10: Maintenance Duty Time

MNT 1.07.02
MNT 1.07.03
MNT 1.07.04

The aircraft operator or approved maintenance organization must establish a fatigue management program to minimize the effects of acute and chronic fatigue amongst maintenance personnel. This must include maximum working hours, minimum rest periods and roster schedules. The requirement to conduct overnight maintenance must be reviewed by a Competent Aviation Specialist.

The safety of any aviation system is dependent upon all participants performing reliably and efficiently. As aircraft maintenance activities are routinely undertaken by technical personnel on a shift work system, it is important that these shifts are managed by a fatigue management program. This program should ensure that fatigue occurring during a shift or accumulated over a period of time due to the pattern of shifts worked and other tasks, does not endanger the safety of a flight.

The aircraft operator, or its contracted maintenance organization(s), must have fatigue management guidance for all maintenance personnel, which, as a minimum, meet the standards required by the responsible regulatory authority.

evidence

The aircraft operator or contracted maintenance organization(s) should provide fatigue management guidance for all maintenance personnel.
This documentation should be in compliance with any associated regulatory guidance.

Records should confirm that aircraft maintenance personnel roster schedules, hours worked and rest periods are in accordance with any documented fatigue management guidance.


Engine Maintenance

1.11: Aircraft Operator Safety Management System

All aircraft operators must have a Safety Management System (SMS) that is fully integrated throughout and across each part of the organization.

Refer to the following information on SMS development:

ICAO Safety Management System

Flight Safety Digest Volume 24 No 11 – 12, Nov – Dec 2005

International Helicopter Safety Team – SMS Toolkit

The Operator's SMS should include:

- A Safety Management System Manual;
- A Safety Policy;
- The appointment of a Safety Manager or Officer;
- The various sub-structures where more than one operating base is in use;
- A Just Culture Policy;
- The frequency and conduct of safety meetings;
- Hazard reporting systems;
- Risk assessment processes;
- Incident reporting;
- Occurrence investigation;
- Auditing;
- Safety training;
- Management of change;
- Safety performance; and
- Emergency response.

evidence

The aircraft operator's Safety Management System should be documented and include the necessary organizational structures, accountabilities, policies and procedures that will facilitate a systematic process for the identification of hazards and minimization of risk.

Records must confirm that these requirements are complied with and that continuous improvement is being tracked and monitored.

ORG 3.01.01
ORG 3.01.03
ORG 3.01.04
ORG 3.01.05
ORG 3.01.06
ORG 3.02.01
ORG 3.02.02
ORG 3.02.03
ORG 3.02.04
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ORG 3.04.02
ORG 3.05.01
ORG 3.05.02
ORG 3.06.02
ORG 3.07.01
ORG 3.07.02
ORG 3.07 03
ORG 3.08.02
ORG 3.08.03
ORG 3.08.04
ORG 3.09.01
ORG 3.09.02
ORG 3.09.03
ORG 3.10.01
ORG 3.10.02

1.12: Accident and Incident Notification

ORG 3.06.03

As part of their SMS, the aircraft operator must advise the company of any incident, accident or non-standard occurrence related to the services provided to the company that has, or potentially has, disrupted operations or jeopardized safety.

International Civil Aviation Organization (ICAO) Annex 13 Aircraft Accident and Incident Investigation provides the definitions of accident, serious incident and incident.

The aircraft operator must have procedures in place to ensure that details of any reportable events are provided to the responsible regulatory or safety investigation authority within specified time limits.

The aircraft operator's procedure should require that any accident, serious incident, incident or non-standard occurrence that has the potential to disrupt operations or jeopardize safety is communicated to company representatives in an agreed timeframe.

The aircraft operator should provide feedback to the company regarding the investigation and close-out of significant incidents and whether any findings could be incorporated in risk mitigation strategies such as route or airfield assessments.

evidence

The aircraft operator should have a procedure to ensure that its senior management, the responsible regulatory or safety investigation authority (as required) and where applicable the company, are informed of any incident, accident or non-standard occurrence that has disrupted or has the potential to significantly disrupt operations or jeopardize safety.

Documented requirements and procedures associated with communication of non-standard events by the aircraft operator should be made available on request.

1.13: Operational Risk Assessment

ORG 3.04.03
ORG 3.04.04
ORG 3.04.05
ORG 3.04.06

Aircraft operators must conduct a risk assessment, including mitigation controls, before commencing operations for any new or existing aviation activity.

Risk assessments are an essential element in identifying and mitigating risks to any operation. The aircraft operator should have a well-developed risk assessment process as part of their SMS and it should be used to review all activities undertaken on both a routine and exceptional basis.

evidence

The aircraft operator's Safety Management System should detail the requirement for the assessment and management of operational risks as an integral part of the planning and execution of any change within the operation.

Documented evidence must be available to demonstrate that the assessment and management of operational risks is being conducted before implementing changes within existing activities or commencing any new operations.

1.14: Sub-chartering Aircraft

ORG 1.02.02

Sub-chartering (cross-hiring) by the aircraft operator must not be undertaken without approval of the contracting company. Regardless of ownership, contracted aircraft must be operated and controlled in accordance with the Air Operator's Certificate (AOC) they are operated under.

The requirement to sub-charter (cross-hire) generally arises when an aircraft operator is unable to fulfil a task using their own aircraft and crew due to unscheduled unserviceability or a last minute request by the company, resulting in the use of an alternative aircraft from another operator.

To ensure that all standard technical and operational expectations of the service to be provided are being met (such as BARS requirements), the aircraft operator must have a process in place to notify the company of potential cross-hire situations as soon as possible. This will enable a review of the alternative service being proposed, and agreement by the client that the alternate service provider will be acceptable.

The aircraft operator should document the process for procuring sub-chartered (cross-hired) aircraft or aircraft services. Such procedures should detail the process to be followed to ensure the operation is suitably authorized under AOC permissions, to advise the company that the requirement has occurred and to gain their written approval for the activity to proceed.

Operators should be prepared for the possible need to sub-charter (cross-hire) aircraft or aircraft services and develop a list of suppliers for cross-hire operations who have been pre-approved for use by the company. Letters of authorization from the company should be available where permission has been sought and granted to utilize cross-hire services.

2.0: Runway Excursions

An aircraft departs the runway during takeoff or on landing and this results in an accident

A runway excursion occurs when an aircraft departs the runway during the takeoff or landing run and can be caused by a number of scenarios:

- A departing aircraft fails to become airborne or cannot complete a rejected takeoff before reaching the end of the runway;
- A landing aircraft touches down in the undershoot area of the landing runway; or touches down too long and is unable to stop before reaching the end of the runway; or
- An aircraft landing, taking off or conducting a rejected takeoff departs the side of the runway.

evidence

Establishing and adhering to SOPs including conducting appropriate standard approach and departure briefings will enhance flight crew decision making and reduce the risk of runway excursions.

A combination of risk factors will contribute to the risk of runway excursions. These factors include: lack of accurate wind information, lack of awareness of contaminated runways (mud, rain, ice or snow), absence of procedures (stabilized approaches), technical issues (improper use of thrust reversers) or poor aircraft performance planning.

Many of these elements are associated with diligent and appropriate actions by the flight crew. However the infrastructure required to support aircraft operations, such as runway preparation, weather reporting, ground-based communications, windsocks and pavement markings are outside the control of the aircraft operator. This may need to be considered by the relevant company.

Engine failure on takeoff from mine site. Aircraft over-run

2.1: Airfield and Helipad Design

Where local guidance is unacceptable to the company, use ICAO Annex 14 Aerodromes, Volume I ('Aerodrome Design and Operation') and ICAO Annex 14, Volume II ('Heliports') for design considerations when constructing, or performing major rework, to permanent long-term company owned and operated airfields and helipads supporting operations.

Consider prevailing winds and the location of mining/facility infrastructure in relation to the proposed airfield or helipad departure and approach splays.

BARS Implementation Guidelines (BIG) Section D provides additional guidance for short-term or emergency use airfields whilst Section E provides additional guidance for helipad standards.

Company considerations in locating and designing airfield and helipads should always incorporate specialist aviation advice and must include the following:

- Prevailing wind direction;
- Obstacles – including mine infrastructure, towers and tailing mounds;
- Open cut mining – blasting operations in the vicinity;
- Flyways for helicopters (rejected takeoff areas);
- Balanced field-length for aeroplanes (allowing for successful abort at decision speed);
- Two-way approaches to landing area as a minimum design basis;
- Forecasted expansion plans of resource facility and resultant aircraft size increase; and
- All infrastructure requirements from the BAR Standard.

The following factors may also influence the design and construction phases of permanent facilities:

- Rigid company supply system requirements may limit the choice of civil contractors to a tender panel that lacks aerodrome/helipad construction experience;
- Lack of consideration of operational and environmental impacts on the runway/helipad design;
- Ineffective risk management of runway repair and works given company operational demands (lost production time due to runway works must be taken into account in the runway works risk assessment process);
- The project managers may lack any aviation expertise and therefore understanding of the operational imperatives;
- Civil engineers with road experience may be contracted to design runway pavement repairs without utilizing the expertise of runway civil engineering experts;
- Use of material that does not fit the technical specifications and the associated lack of independent testing the material used in runway seal, pavement construction and repair of materials; and
- Lack of understanding within project team owners/management of the aviation risk and operational impacts when optimizing the scope (cost) of aerodrome projects.

evidence

ICAO Annex 14 should be included in design considerations for any permanent airfield and helipad design facility when local guidance is unacceptable to the BARS Member Organization.

2.2: Airfield Inspections

In addition to reviews required by regulators, all company owned and/or operated airfields must have an annual operational control and safety review conducted by a company approved Competent Aviation Specialist.

Companies who own and operate airfields should conduct an annual operational review by a qualified aviation specialist. This will address the entire aviation system on the airfield over and above regulatory inspections.

The annual review will complement any regulatory required inspection by focusing on all aspects of an aviation operation. This review would include: passenger control, freight management, aircraft refueling, wildlife control, daily airfield inspections, airfield management, rescue firefighting, perimeter fencing, weather reporting, runway taxi markings, Obstacle Limitation Surfaces, emergency response planning and preventative maintenance.

Where airfields are not registered and therefore not subject to requirements for changes in aerodrome information, the aerodrome operator must provide such information directly to relevant aircraft operators.

2.3: Landing Site Assessments

FLT 1.02.11

Aircraft operators must conduct landing site assessments prior to commencing operations. Incorporate the results into the operational risk assessment (Control 1.13).

Conducting a landing site assessment prior to commencing operations to a new location provides a necessary level of assurance for the conduct of safe operations. This can be a desktop review using available and documented information, or for more routine and established operations consist of an actual site visit to review facilities, infrastructure and the surrounding environment.

evidence

The aircraft operator’s procedures drafted in preparation for commencement of operations to a new destination should prescribe landing site assessments. Completion of such an assessment will allow the aircraft operator to determine the presence of any operational risks to be addressed and facilitate the management of identified risks through the Safety Management System.

2.4: Balanced Field Length

All multi-engine aeroplanes must meet balanced field requirements where following an engine failure on takeoff, the aircraft can stop on the remaining runway and stop-way, or, using the remaining runway and clearway, climb and achieve a net climb gradient greater than the takeoff path obstacle gradient.

To optimize the safety benefits of multi-engine aircraft during takeoff, a runway length should be sufficient to ensure that an aeroplane can safely stop (accelerate-stop) or safely takeoff (accelerate-go) if one engine fails. Manufacturers of aircraft in this category provide detailed performance analysis charts to allow for full performance analysis by the aircraft operator.

The balanced field length is the minimum runway length required where both accelerate-stop and accelerate-go distances are achieved. The speed at which the decision whether to stop or go in the event of an engine failure is known as V_1.

The takeoff decision speed (V_1) is not fixed and will be affected by a number of variables including temperature, wind, elevation, slope, runway contamination and aircraft weight and configuration. The easiest variable influenced by companies is the aircraft weight. To achieve balanced field length may mean the aircraft payload has to be reduced, and less passengers than seats available will be carried.

The company should always: (1) consider the performance expectations of aircraft prior to runway construction and (2) contract aircraft of adequate performance to assure balanced field length is attained in all cases.

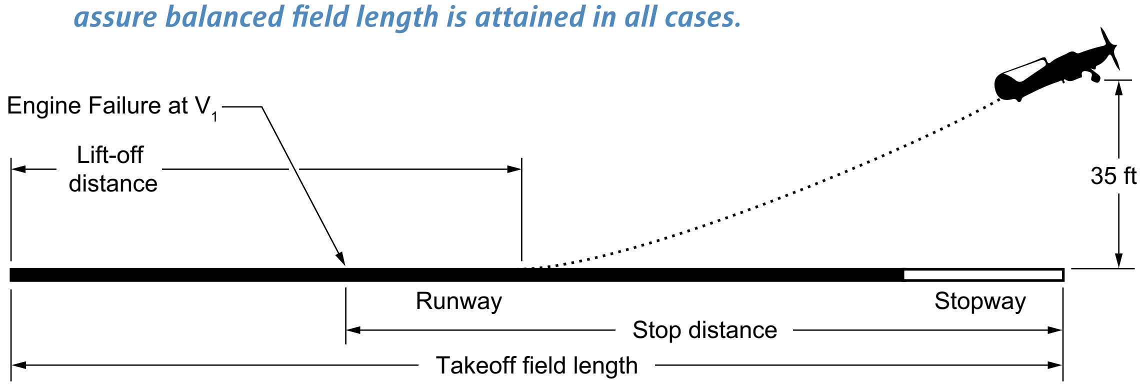


Figure 4: Balanced Field Length

The aircraft operator should be able to demonstrate flight crew familiarity with balanced field length calculations and when they are required to calculate it. Crews should be initially trained in the performance aspects of their particular aircraft and the procedures for calculating performance should be clearly detailed in the Operations Manual. Where applicable, mandatory proficiency checks should examine crew competence in performance calculations and their application.

2.5: Balanced Field Length – No Performance Charts

Multi-engine aeroplanes that do not have the appropriate Flight Manual performance charts to achieve Control 2.4 must restrict their payload so that in the event of an engine failure, the net takeoff path clears obstacles by 35 feet up to a height of 1500 feet above the aerodrome, using the following conditions:

The failure occurs:

- ***When the aeroplane has reached the published best Rate of Climb (V_y) speed;***
- ***With undercarriage up (if retractable);***
- ***When the flaps are fully retracted; and***
- ***With propeller on the inoperative engine feathered.***

Aircraft certificated to the requirements of United States Federal Aviation Regulation (FAR) Part 23 are in the 'commuter' category and not subject to the same rigorous certification standards that are applied to FAR Part 25 aircraft in the 'transport' category.

FAR	Category	Description	Examples
Part 23	Commuter	Maximum Takeoff Weight (MTOW) cannot exceed 19,000 pounds (8,618 kg).	King Air, Metro, Twin Otter
Part 25	Transport	Jets with 10 or more seats or a MTOW greater than 12,500 pounds (5,670 kg); or Propeller-driven aeroplanes with greater than 19 seats or a MTOW greater than 19,000 pounds (8,618 kg).	F-100, Boeing, Airbus, Gulfstream DHC-8, ATR-42, Fokker F-50

Figure 5: Certification Standards

Unlike aircraft certificated under the requirements of Part 25 (where Control 2.4 applies), aircraft operating under a Part 23 certification may not be provided with the charts to enable assessment of aircraft performance in all stages of the takeoff sequence. In these circumstances, Control 2.5 applies. The aircraft operator must have performance charts available that will allow performance to be predicted and loading adjusted to achieve compliance with the requirements of this control.

evidence

Each multi-engine aircraft must have the takeoff performance charts available in the Flight Manual or Pilots Operating Handbook that will permit the flight crew to make an analysis of takeoff performance and adjust loading where necessary.

Procedures for calculating takeoff performance should be clearly detailed in the Operations Manual and the initial training of flight crew should cover the performance aspects of the particular aircraft type. Crew competence in performance calculations and their application should be assessed during proficiency checks.

2.6: Destination Weather Reporting

For company owned and operated airfields and helidecks, communicate the following data to arriving aircraft by either an Automatic Weather Observation System (AWOS) and/or trained weather observer:

- ***Wind direction and speed;***
- ***Temperature;***
- ***Barometric pressure; and***
- ***Cloud ceiling height and visibility.***

Maintain all equipment on a current calibration register.

Reporting of actual weather conditions at an airfield or helideck significantly enhances the safety of the aviation operation. The prevalence of AWOS equipment provides greater guarantees to the effectiveness of this control rather than relying on having trained weather observers on site at all times. However, either option satisfies the intent of the control.

Considerations for company owned and operated facilities:

The AWOS should have the capability of transmitting on a discrete frequency to arriving aircraft.

The ability to provide cloud base and visibility is an important aspect to an AWOS that should not be overlooked when procuring equipment.

Training required for a weather observer should include: the issuance of a radio operator licence for communication, training on all equipment required to take measurements and training associated with basic aviation meteorology. Any training course should be recognized by the national meteorology bureau and although not prescribed is typically three to five days in duration. Consider recurrent training for weather observers.

2.7: Slope guidance

Install visual slope guidance on company owned and operated airfields.

An approach path lighting system is an invaluable tool that assists pilots of aeroplanes to fly the correct approach angle to the runway. It also has the added benefit of defining the center of the touchdown zone. Both aspects of the PAPI system assist in mitigating the risk of either touching down short of the touchdown zone (or undershooting the runway with the consequent risk of striking objects below the standard flight path) or touching down past the touchdown zone with the consequent risk of a landing runway excursion.

evidence

The aircraft operator's documentation should detail how the PAPI system works, what acceptable approach parameters are and how the PAPI should be used during the conduct of a stabilized approach.

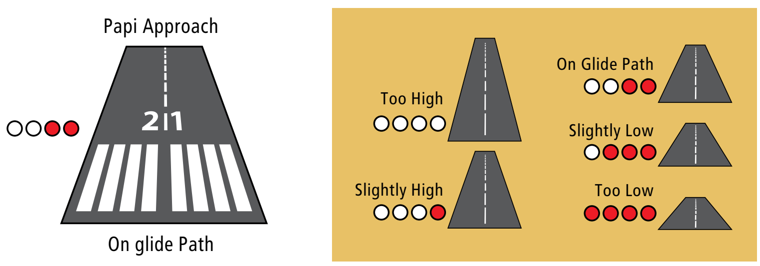


Figure 6: PAPI Lights – use of red and white provides glideslope indication

3.0: Fuel Exhaustion

An aircraft conducts a forced landing or ditching as a result of fuel exhaustion and this results in an accident

Assurance for safe flight depends on many factors, including guaranteed reliable power being produced when required. Fuel mismanagement leading to fuel starvation or exhaustion is a direct cause of power loss, and continues to be an issue in resource sector operations.

Two factors contribute to fuel mismanagement and loss of power:

- Fuel exhaustion – no usable fuel remaining to supply the engine(s); or
- Fuel starvation – fuel supply to engine(s) is interrupted although sufficient fuel remains on-board (e.g. incorrect tank selection).

Basic fuel management principles required by an aircraft operator include the following:

- Knowing exactly how much fuel is being carried at the commencement of a flight;
- Knowing the fuel required to satisfy the flight plan route plus reserves;
- Knowing how much fuel is being consumed, taking into account all variables such as power settings, cruise levels and effect of wind and course deviations; and
- Flight crew knowledge of the aircraft fuel supply system and adhering to procedures when selecting tanks and fuel sources during all critical phases of flight.

Accurate fuel planning requires the resource company to provide clear and unambiguous flight routing requests to the aircraft operator. This will enable flight crew to address all basic fuel management principles.

3.1: Fuel Check

FLT 1.03.01

The aircraft operator must have procedures in place that require the Pilot-in-Command to ensure the required amount of fuel is on-board the aircraft prior to each flight.

The risk of fuel exhaustion is greatly reduced when flight crew accurately determine the amount of fuel on-board prior to starting and confirm that quantities are sufficient for the flight planned. Determination of this quantity should be cross-checked using a minimum of two sources, such as:

- Fuel Quantity Gauges;
- Dipsticks;
- Flow Meters/Totalizers; and
- Calculations from previous refuels and fuel usages (checked regularly for accuracy).

Accurate knowledge of fuel quantity at the start of a flight is essential for any fuel critical operation. All subsequent assessments to the safety of the flight are derived from that initial number. If only one fuel quantity measurement is used, then it is not possible to determine if the system is working properly because there is no reference point.

The aircraft operator's procedures should require fuel quantity checks to be conducted prior to each flight and provide details of the acceptable methods for undertaking such checks. The aircraft operator's procedures should provide for the quantity of fuel on-board to be checked by two separate and independent methods.

In-flight checks

Fuel burn will be constant for a consistent combination of altitude, power setting and mixture setting (where applicable). Changing winds and deviations due to weather conditions will vary the groundspeed and therefore the range. Flight crew should regularly update fuel status, at least every hour, to ensure adequate reserves are maintained.

The aircraft operator should specify procedures for the flight crew to monitor in-flight fuel quantity, to detect any anomalies that may appear in planned versus actual fuel burn. Fuel flows greater than planned, stronger headwinds, in-flight fuel leaks and course deviations have all contributed to past resource sector accidents. Constant monitoring of fuel quantity at designated time intervals or waypoints is critical to the safe progress of any flight.

evidence

The aircraft operator must document SOPs that require the aircraft Pilot-in-Command to confirm the required amount of fuel is on-board the aircraft prior to each flight. Such procedures should provide for the quantity of fuel on-board to be checked by two separate methods and should state a maximum tolerance to apply to any difference in quantities determined by the two methods. SOPs should also cover the conduct of in-flight fuel progress checks that will enable the early detection of a fuel anomaly.

The flight record or similar document should demonstrate that the SOPs have been complied with and that the required pre-flight and in-flight fuel checking and monitoring has been conducted.

3.2: Flight Plan Weather Data

FLT 1.06.01
FLT 1.06.04

Provide the flight crew with access to reliable weather information when determining fuel loads in pre-flight planning.

Key flight safety considerations include ensuring relevant weather data and forecasts are made available to flight crew for flight planning purposes. Before commencing a flight, flight crew must have access to and assess the weather reports and forecasts for the route to be flown and the airfields to be used, including any airfields that may need to be considered as alternate destinations.

The aircraft operator should retain operational records associated with any flight for a period of 90 days.

When aviation operations are conducted in remote areas outside the influence of reliable national meteorological coverage, effort must be made by the aircraft operator, assisted by the company if required, to access forecasted weather data from global sources. Reliance on communication networks (internet, satellite phone, etc.) will be required.

Access to good quality weather data to support an aviation operation should always form part of a pre-mobilization risk assessment.

evidence

The aircraft operator must document a description of minimum expectations associated with weather forecast review used in support of pre-flight planning. Flight crew must ensure that they obtain and assess a weather forecast that covers the route to be flown, the planned destination and when required, the airfield that is to be provided for as an alternate destination.

Documentation associated with the flight should be retained for a minimum period of 90 days and this information should include any relevant meteorological forecasts.

3.3: Flight Plan

FLT 1.06.06

Flights must be conducted on an Instrument Flight Rules (IFR) flight plan lodged with the relevant air traffic control service provider. If this is not possible, Visual Flight Rules (VFR) flight plans are permitted but must be lodged with a responsible party (air traffic control service provider, aircraft operator or company site representative) and flown under a flight-following regime.

An IFR flight plan requires greater prescription in the routes and altitudes flown and fuel contingency planning. It will also provide a greater level of air traffic control services with the flight than would otherwise apply under a VFR flight plan.

Air traffic control provided for IFR traffic will focus on traffic notification and positive separation services, and will also provide continuous flight following that enables continuous access to SAR (Search and Rescue) alerting services.

Where it is not possible to conduct a flight under the IFR, an aircraft operator may conduct the flight under the VFR (where authorized by the applicable regulatory authority). Where it is intended to operate a flight under the VFR, a flight plan notification must be lodged with an organization that is responsible for SAR alerting. A flight notification may be submitted by any acceptable method that allows the organization responsible for SAR alerting to accurately record the flight details, including departure and destination, flight times and SAR alerting time.

The aircraft operator should retain operational records associated with any flight for a period of 90 days.

evidence

The aircraft operators must document a policy that requires, where practical, all flights to be conducted under a flight plan that has been filed in accordance with the requirements for IFR flights. Where an aviation operator's policy allows flights to be conducted under the VFR in defined circumstances, the requirements for flight notification must be clearly stated. Associated flight records must confirm that flights conducted at night or under the IFR for BARS Member Organizations (BMOs) are only conducted in compliance with IFR flight planning requirements.

3.4: Instrument Flight Rules (IFR) Fuel Plan

In addition to operational holding fuel requirements, fuel loads must cover fuel used during start-up, taxi, en route, approach and transit to the alternate destination (if required). Carry additional variable reserves of 10% of the trip fuel and 30 minutes as fixed reserve.

FLT 1.07.01
FLT 1.07.02
FLT 1.07.03
FLT 1.07.04
FLT 1.07.05

An aircraft that carries only just enough fuel for the planned flight, but which encounters unanticipated headwinds and may have to fly at a lower level must rely on the fuel reserves carried to safely complete the flight. Fuel reserves are designed to only be used in unforeseen circumstances, and many aircraft arrive safely at their destination having used a portion of the allocated variable reserve fuel. However an aircraft's fuel supply should not reach a state where fixed reserve fuel is being burned and upon arriving at its destination it cannot accept any further delay in landing.

For those aircraft operators who have a fuel policy with a larger fixed reserve (>45 minutes) and a variable reserve not smaller than 5% of trip fuel, this may conform to this control providing that the fuel policy is in accordance with local regulatory approvals and the flight time is less than five hours.

evidence

The aircraft operator must document a fuel policy for IFR flights that meets the minimum requirements legislated by the responsible regulatory authority, or that is consistent with their guidance. In circumstances where the regulatory fuel quantity requirements are less than that required by the BAR Standard, the Standard applies.

Associated records such as aircraft load-sheets, flight logs and fuel records should confirm that documented procedures and requirements for determining the amount of fuel to be carried on IFR flights have been applied appropriately.

3.5: Visual Flight Rules (VFR) Fuel Plan

FLT 1.07.06
FLT 1.07.07

Fuel loads must cover the planned route. Carry an additional variable reserve of 10% of the trip fuel and 30 minutes as fixed reserve.

The responsible regulatory authority will specify the minimum fuel that must be carried on a VFR flight either through provision of specific prescriptive regulations or guidance on determining minimum fuel requirements. In all situations, the minimum quantity of fuel to be carried must not be less than that required by the BAR Standard.

evidence

The aircraft operator must document a fuel policy for VFR flights that meets the minimum requirements legislated by the responsible regulatory authority, or that is consistent with their guidance. In circumstances where the regulatory fuel quantity requirements are less than that required by the BAR Standard, the Standard applies.

Associated records such as aircraft load-sheets, Flight Logs and fuel records should confirm that documented procedures and requirements for determining the amount of fuel to be carried on VFR flights have been applied appropriately.

3.6: Hot Refueling

FLT 1.03.01
FLT 3.01.01
FLT 3.01.02
FLT 3.01.03
FLT 3.01.04
FLT 3.01.05
FLT 3.01.06
FLT 3.01.07
FLT 3.01.08
FLT 3.01.09
FLT 3.01.10

Hot refueling must only be conducted when considered operationally necessary and must be approved by the company prior to use. Hot refueling with gasoline and wide cut turbine fuel is prohibited. Aircraft operators must have a procedure on hot refueling which includes the following requirements:

- ***No passengers are to be on-board during refueling unless the Pilot-in-Command assesses that it is safe to do so. In this scenario passengers must receive a safety brief prior to refueling. No side well-seats are to be used (e.g. Bell 212, 214, 412);***
- ***Firefighting capability must be available and manned;***
- ***The aircraft operator's Operations Manual must detail all aspects of hot refueling, including personnel training, sequence of aircraft grounding and duties of personnel (in addition to the pilot) required: a minimum of three for helicopter ops – one for refueling, one for pump shut-off and one for fireguard;***
- ***Radios are not to be used during refueling;***
- ***Prior to removing the fuel cap and inserting the fuel nozzle or connecting the pressure hose into the aircraft fuel tank, grounding wires running from the fuel station and from the fuel hose to the aircraft must be connected;***
- ***When refueling is completed, the Pilot-in-Command must verify that all equipment is removed, the fuel cap has been securely replaced and the aircraft is properly configured for flight; and***
- ***Correct fuel loads must be confirmed by the Pilot-in-Command prior to departure.***

Refueling aeroplanes with engines operating must not be conducted unless a specific procedure has been approved by the aircraft manufacturer and regulator and is further supported with documented training of both flight and ground crew. An APU running without engines operating does not constitute hot refueling and is acceptable.

Refueling aeroplanes with engines operating must not be conducted in normal circumstances and only if the APU is inoperative. Personnel manning firefighting equipment must be present during the activity.

Hot refueling must only be conducted when considered operationally necessary and must be approved by company prior to use. Aircraft operators must have documented procedures covering all aspects of hot refueling.

Hot refueling is the practice where the aircraft is refueled with the engine running and in the case of most helicopters, with rotors rotating. Helicopter hot refueling poses the greatest risk. Accordingly the BAR Standard requires an aircraft operator to have regulatory approval for aeroplane hot refueling as per Control 3.6.

In helicopter operations, the noisy and dynamic environment complicated by added threat of 'hot'/active engine(s) in close proximity to the open refueling activity demands additional controls to be in place to ensure safe conduct.

Hot refueling of helicopters should only be performed when agreed to by both the aircraft operator and the company, and should be on the basis of an operational requirement and not convenience. Examples of operational requirements include:

- Seismic and External Load operations involving high movement cycles;
- Excessive wind speed make full shutdown impractical or dangerous;
- Medical evacuation requiring quick turn-around;
- Search and Rescue; and
- When the risk of a failed engine-start outweighs the risk of hot refueling.

The documented procedures required by the aircraft operator should be in the approved Operations Manual and include as a minimum:

- The operational circumstances in which hot refueling may take place;
- The procedures to be followed during hot refueling;
- Three ground crew for helicopter hot-refueling operation (1) refueler, (2) emergency pump shut-off guard and (3) fireguard;
- All persons engaged in hot refueling must be trained in, and familiar with, the procedures to be followed during hot refueling or any emergency that may occur in relation to the refueling;
- Suitable and properly maintained firefighting equipment must be readily available for use if an emergency occurs during the refueling;
- Before carrying out hot refueling on an offshore oil rig, gas rig or platform, a drilling ship or any other vessel, the approval of the operator or master of that installation or vessel must be obtained;
- The quantity of fuel to be loaded must be decided before hot refueling is commenced;
- A properly licenced pilot must remain at the controls of the aircraft throughout the hot refueling process and maintain contact with the person on the ground in charge of the refueling system by means of an electronic intercommunication system or by visual contact and an agreed system of signals;

- All passengers disembarked from the aircraft (helicopter) prior to commencement of refueling procedures, except in the case of a passenger who cannot, in the opinion of the pilot or on medical advice, be safely disembarked;
- Before the fuel filler cap is removed, the refueling equipment and aircraft must be earthed and connected so as to ensure they are of the same electrical potential;
- While hot refueling is taking place, radio transmissions must be restricted to the greatest extent practicable. HF radio and weather radar must not be used;
- On completion of the refueling operation, the Pilot-in-Command confirms that all equipment has been removed from the vicinity of the helicopter prior to departure from the refuel point, the fuel cap has been securely replaced, the correct fuel quantity has been loaded and the aircraft is properly configured for flight; and
- The fuel supplied is managed by a fuel quality audit program and whose regular audit reports are checked by the aircraft operator.

Image provided by DSE

evidence

Where hot re-fueling is to be utilized for helicopter operations, the aircraft operator must have approved procedures that are documented. In addition to addressing applicable regulatory requirements, the procedures should articulate all minimum items contained in the BAR Standard and details contained within these guidelines.

4.0: Fuel Contamination

An aircraft is forced to land at unprepared sites with minimal warning due to contaminated fuel and this causes a loss of engine power and an accident

Aircraft engines are intolerant to fuel contamination and will readily fail if provided with out-of-specification fuel. Maintaining the quality and cleanliness of aviation fuels is fundamental to aviation safety.

Personnel responsible for the transportation, storage or dispensing of aviation fuels are a key part of the aviation safety equation. The guidelines, procedures and standards prescribed by the fuel manufacturer must be adhered to at all times.

All parties associated with flight operations (aircraft operator and company) must be cognisant of the requirement for high quality and tested fuel to ensure any potential contaminants are eliminated or separated out of fuel before it is pumped into the aircraft. Fine sediment in fuel may block the aircraft fuel filters and erode critical parts in the engine and fuel control systems. Free water (water not dissolved in the fuel, but microscopic droplets held in suspension) may freeze at high altitudes or cold outside air temperatures and clog the fuel screens/filters, causing the engine(s) to cease operation.

Particular care should be taken to avoid contamination with the wrong types or grades of fuel as this can cause aircraft fuel system or engine damage and possible failure in-flight.

4.1: Fuel Testing

When testing the fuel supplied use water detector capsules or an equivalent that is able to test for water in suspension. The Pilot-in-Command must verify that the quality of the fuel being uplifted is acceptable for operation of the aircraft. FLT 1.08.01

Aircraft fuel has the ability to hold water, thereby contaminating the fuel being supplied to the engine(s). Water can be held in the fuel in a number of states including dissolved, in suspension and free. There are a number of fuel testing regimes available, but it is the aircraft operator's responsibility to document acceptable methods to confirm that the fuel is free of water contamination.

evidence

The aircraft operator's SOPs and maintenance documentation should document the requirements and/or procedures for fueling of aircraft and performing fuel testing as part of the pre-flight preparation process. Where an accredited third party agency provides fuel they should have procedures in place that provide the equivalent level of compliance. In such cases, the aircraft operator should have a quality assurance process to ensure that the third party provider is delivering fuel of an acceptable standard.

Records such as audit schedules, checklists, reports and non-conformance/ corrective action closeout reports must confirm that the ongoing quality of fuel supplies is being provided.

4.2: Fuel Filtration

Equip fuel delivery systems including portable systems with water blocking filtration of the Go/No-Go types. Mark filter canisters with the next date of change or inspection cycle. Replace all filters at nominated pressure differentials as annotated on the filter housing or as recommended by the manufacturer. This must be performed at least annually.

Where fuel is being provided by a recognized supplier using internationally accepted practices, an equivalent level of risk management may be considered as being in place if all applicable procedures are being complied with.

The aircraft operator should document the process by which fuel delivery systems including portable systems that are to be used for fueling the aircraft operator's aircraft are assessed and suitable for use.

Where the fuel system is owned and/or operated by the aircraft operator, the operator's documentation should detail procedures, such as initial and routine audits, that ensure fuel delivery systems used in fueling aircraft meet the required standards.

Where fuel is supplied from a recognized third-party provider, the aircraft operator's SMS should address how fuel quality control is guaranteed.

4.3: Fuel Sampling

When installing supply fuel tanks at company owned and operated facilities, a slope at the base with a sump drain at the tank low point (or equivalent) for sampling purposes must be specified for installation.

When using a dedicated fuel source, a sample from the source must be retained in a clear jar with screw-top-lid, labeled with the current date and retained until completion of the daily flying activities.

The aircraft operator's SOPs should contain requirements for fuel testing as part of the pre-flight preparation process. During the conduct of these procedures, flight crew may request to view the relevant fuel sample prior to commencement of fueling.

Daily fuel samples should be retained until completion of the daily flying activities as evidence that the fuel stored in the installation is fit for use in aircraft. Such samples enable demonstration of the fuel's chemical compliance with published standards following an aircraft incident that had received fuel from the installation.

The aircraft operator's documentation should detail the requirements for performing fuel testing as part of the pre-flight preparation process.

The aircraft operator's documented requirements for initial and routine audits of fuel delivery systems that are routinely used in fueling the operator's aircraft should provide for assessment of compliance with the required storage and daily fuel sampling procedures.

The aircraft operator's audit program that applies to fuel supplies, including audit schedules, checklists, reports and non-conformance/corrective action closeout reports, must confirm the ongoing quality of fuel supplies (such as fuel installation daily product quality checks).

4.4: Fuel Storage

Prior to testing and approval for use, all fuel storage facilities must be allowed to settle one hour per one foot of fuel depth (or three hours per meter) after the tanks have been resupplied, or in the case of drum-stock when the barrels have been moved to the vertical. Additional storage requirements include:

- ***Storage tanks must have floating suction or minimum standpipe;***
- ***Bulk deliveries must be filtered into storage tanks;***
- ***Fuel systems must be identified by placard during the settling period indicating the time when settling will be completed;***
- ***Steel tanks must be lined with an approved epoxy liner unless the tanks are constructed of stainless steel; and***
- ***Company new-build fuel systems must have stainless steel and connection welded plumbing.***

Where fuel is being provided by a recognized supplier using internationally accepted practices, an equivalent level of risk management may be considered as being in place if all applicable procedures are being complied with.

The aircraft operator should document the process by which fuel delivery systems including portable systems that are to be used in fueling the aircraft are assessed and determined to be suitable for use.

evidence

The aircraft operator's documentation should include procedures, such as initial and routine audits, that ensure fuel delivery systems and their associated operating procedures meet required standards.

The aircraft operator's audit program that applies to fuel supplies would normally be one component of the Safety and Quality Management System. Associated records such as audit schedules, checklists, reports and non-conformance/corrective action closeout reports must confirm that fuel delivery systems used for fueling the operator's aircraft, and their associated operating procedures, meet the required standards.

4.5: Drummed Fuel

FLT 1.08.02

Aircraft operators who make use of drummed fuel in the course of their operations must have a procedure in place addressing the management and use of drummed fuel stock. The following performance requirements must be addressed:

Storage:

- ***Drums must be stored:***
  - ***horizontally with access bungs at 3 and 9 o'clock; or***
  - ***vertically with drum top cover in place to prevent the accumulation of water on the drum lid; and***
- ***Drums must have minimal contact with the ground (using wooden slats or equivalent) and be stored under cover.***

Quality:

- ***Fuel must be consumed within its Aviation Release Note certification date*;***
- ***The access bungs must be tight and the seals unbroken prior to use;***
- ***The fuel must be sampled and include a positive test for the presence of water using water detecting capsules or paste;***
- ***The refuel pump must be equipped with a Go/No-Go filter; and***
- ***Before fueling the aircraft, a small amount of fuel must be pumped into a container to remove any contaminants from the hose and nozzle.***

To provide optimum opportunity for any contaminants to settle, drums must be brought to the vertical three hours prior to testing. Where this is not practical (e.g. SAR, Emergency Response, etc.) all performance requirements of this control must be followed.

The aircraft operator should document in their Operations Manual specific requirements and/or procedures that are to be followed for the storage and use of drummed fuel, whether it is under their control or that of a third party. The procedures must provide assurance of the quality of drummed fuel supplies that are to be used. The aircraft operator's documented procedures must be consistent with guidance provided by fuel manufacturers where these are more stringent than the BAR Standard.

evidence

The aircraft operator's SOPs and maintenance documentation should detail the requirements and/or procedures that must apply as part of the pre-flight preparation process, where drummed fuel is used for fueling of an aircraft. Such procedures should require the Pilot-in-Command to assess that the drum-stock to be used has been stored appropriately. The aircraft operator's documentation should also detail procedures, such as initial and routine audits, that provide assurance of the ongoing quality of fuel supplies.

*Where authorized testing of out-of-date fuel is permitted by the fuel provider and the original certification period is extended, drummed fuel may be used up until that date but not exceeding two years.
The revised certification documentation must be retained for the duration the drummed fuel is held on stock.

5.0: Controlled Flight Into Terrain (CFIT)

An airworthy aircraft under the control of crew is flown into the ground (or water) resulting in an accident

Controlled Flight into Terrain (CFIT) occurs when an airworthy aircraft under the control of the flight crew is flown unintentionally into terrain, obstacles or water, usually with no prior awareness by the crew.

CFIT has been associated with a large number of fatal accidents in the resource sector involving both fixed and rotary wing aircraft. In many industry accidents, a recurring root cause involves aircraft operating under Visual Flight Rules in a degraded visual environment that otherwise might have been better suited for operations under Instrument Flight Rules. Unpressurized aircraft (both aeroplanes and helicopters), working below the weather to get in and out of mine sites in areas of mountainous terrain raise the risk of CFIT considerably.

Similarly, night helicopter offshore operations, or onshore in remote areas, have resulted in a high number of fatal accidents due to CFIT.

Although CFIT remains a significant cause of incident within the aviation industry, it is widely recognized that these accidents are preventable. The following controls from the BARS are aimed directly at preventing CFIT accidents.

Flight Operations – Andes Mountains, Chile

FLT 1.05.05
FLT 1.13.15

5.1: Night or Instrument Flight Rules (IFR) – Two Crew Operations

Flights flown at night or in IFR must have two-pilots who hold valid and current instrument and night flying ratings using Standard Operating Procedures (SOPs) contained in the Operations Manual. Refer to the FSF ALAR Toolkit (www.flightsafety.org).

Having two qualified pilots that comply with approved SOPs reduces the risk of human error in an environment dominated by incidents attributed to human factors. Using two-pilots helps mitigate the risk in the following ways:

- Workload distribution: Single-pilot operations require the pilot to perform the role of pilot, navigator, radio operator, systems manager, on-board meteorologist, record keeper and passenger control. The workload further increases when outside visual cues decrease, i.e. at night or when operating under the IFR in turn warranting an additional crew member;
- Error recognition and trapping: Approved SOPs that require the non-handling pilot to monitor the actions of the handling-pilot with the aim of identifying any error or omission made in operation of the aircraft. As a coordinated crew any identified error is discussed, rectified and monitored to negate any safety impacts; and
- Reduction in fatigue: With a decrease in outside visual cues at night or under IFR comes an increased use of instruments to provide necessary situational awareness. This requires an increase in concentration levels required by a pilot and a greater risk of fatigue-related errors which can be mitigated by a second crew member.

evidence

The aircraft operator must have a documented procedure requiring that flights conducted at night or under the IFR are crewed by two qualified pilots when operating for a BARS Member Organization. The aircraft operator's SOPs must clearly specify the duties that are to be performed by the second pilot and detail the crew coordination processes that apply. For aircraft that are certified to be operated by a single-pilot and where the aircraft operator chooses this option for day, VFR or non-resource company flights, a separate set of SOPs must be in place for the single-pilot role.

Associated flight records should confirm that flights conducted at night/IFR are crewed by two appropriately qualified pilots in accordance with the SOPs. Flight crew files and rostering records must confirm appropriate implementation of these requirements.

5.2: Special VFR Procedures

Planned use of Special VFR procedures must only be used when endorsed by a Competent Aviation Specialist.

Special VFR procedures, where authorized for use, allow visual flight operations to be conducted in technically Instrument Meteorological Conditions (IMC). Typically these occur where there are distinct changes to the meteorological conditions in close proximity to the airfield. For example, in coastal environments with low cloud along the coast and clear conditions offshore or inland and mountainous regions where low stratus may be encountered in valley airports, but where the airspace further away from the mountains is clear of weather. Air Traffic Control may authorize Special VFR procedures to be conducted in controlled terminal airspace in situations where weather conditions do not meet VMC criteria.

The adoption of Special VFR procedures substantially increases the risks of an operation and to fly Special VFR safely, it is essential that the pilot has a thorough knowledge of the airport and its surrounding environment.

evidence

The aircraft operator's SOPs should either detail that Special VFR is not authorized, or where the aircraft operator has specifically authorized Special VFR operations, that there is a process whereby the company is advised and provided with the opportunity to agree to the practice. A risk assessment involving the company's aviation specialist would normally accompany such approvals.

Companies should be aware of the use of Special VFR supporting their activities and this should be discussed during Operations Reviews.

5.3: Night or IFR – Aircraft

Flights flown at night or under IFR must be conducted in a multi-engine aircraft.

Night or IFR conditions are representative of environments in which a successful emergency landing may not be assured therefore twin-engine operations are recommended.

BARS Member Organizations contracting for night or IFR operations should require multi-engine aircraft on contract.

5.4: Night or IFR – Flight Planning

Flights flown at night or under IFR must be conducted in compliance with an IFR flight plan. FLT 1.02.14

Operation of a flight under the provisions of an IFR flight plan imposes the most stringent requirements in relation to routes to be followed and the levels to be maintained to ensure adequate obstacle clearance throughout the flight.

evidence

The aircraft operator must have a documented policy requiring that flights operated at night or under the IFR for any BMO is only conducted under a flight plan that has been filed in accordance with the requirements for IFR flights. Associated flight records should confirm that flights conducted at night or under the IFR are only conducted in compliance with IFR flight planning requirements.

5.5: Night or IFR – Simulator Training

FLT 2.04.01

For long-term contracts, crews operating any aircraft at night or under IFR must attend initial and recurrent simulator training. Flight Training Devices may be used when they are available for that aircraft type.

Use of simulators or Flight Training Devices enable crews to practice abnormal operations (engine and/or system emergencies) in conditions and situations that would present an unacceptable risk to train and practice in an aircraft. It allows them to become comfortable with the application of procedures in critical or adverse situations that cannot be safely replicated in the aircraft during training.

The company and aircraft operator should consider whether simulators are considered 'reasonably available' prior to a contract being awarded.

evidence

Where the aircraft operator's check and training program utilizes flight simulators, the Operations Manual must contain procedures for their use. The documented program should follow established criteria and cover requirements and procedures for the use of simulators in the conduct of initial and recurrent training and checking.

Pilot training records should confirm that requirements of the training program applicable to the use of flight simulators have been appropriately applied in the initial and recurrent training of pilots and the ongoing evaluation of pilot competency.

The responsible regulatory authority should provide advice regarding the ongoing approval status of flight simulators and flight training devices.

5.6: Night or IFR – Approach/Landing Recency

FLT 2.06.02

IFR and night approach recency must comply with the responsible regulatory authority's requirements, but not include less than three night takeoff and landings for each pilot in the preceding 90 days.

Flight crew manipulative skills need to be practiced frequently to maintain minimum competencies. This is particularly true for night and instrument environments where a combination of manipulative skills and situational awareness require optimum performance from the flight crew. Recency requirements are commonly conducted during normal line operations with little disruption to normal schedules. However it may be necessary for the aircraft operator to schedule either specific recency training flights or simulator exercises in order to maintain the stated requirements.

The aircraft operator must not assign flight crew to a flight unless they meet the minimum recency requirements of either the BAR Standard or the responsible regulatory authority (whichever is the more stringent).

The aircraft operator must have a records management system for recording and monitoring all relevant flight crew recency parameters including, but not limited to, day/night takeoffs and landings and instrument approaches.

The aircraft operator must document the system by which recency requirements are tracked. While manual, paper-based systems are acceptable; computer programs that more accurately track the varying limits are readily available and are preferable.

Where the BAR Standard is not used for all operations, there should be a method for indicating that crew who fail to meet the Standard recency requirements are excluded from BMO operations until these requirements are met.

Associated records must confirm that pilots are maintaining the required recency and that the rostering system has attended to upcoming requirements prior to expiry. Flight crew files and rostering records confirm implementation.

5.7: Night or IFR – Autopilot

FLT 1.02.16

An Autopilot or AFCS must be fitted for night or IFR flights.

The aircraft Autopilot or Automatic Flight Control System (AFCS) provides assistance to the flight crew throughout the flight by relieving the Pilot Flying (PF) from routine manipulative tasks. The correct use of automated systems significantly reduces pilot workload enabling time for other flight management demands. The availability of an Autopilot greatly increases a pilot's ability to maintain situational awareness, respond to unanticipated changes (e.g. ATC instruction, weather conditions, etc.) and correctly respond to and manage an abnormal or emergency situation.

Many industry accidents have cited the failure of flight crew manipulative skills when automated systems have failed or been disabled. Retention of core flying skills remains a key component in the safe operation of an aircraft and flight crew should regularly practice maintenance of these skills when in a low-threat environment to avoid automation dependency. The aircraft operator should have documentation that details the conditions under which automation systems may be disengaged and manual flight undertaken.

The aircraft operator should have SOPs, consistent with the information provided in the aircraft and/or Autopilot manufacturer's Aircraft Flight Manual (AFM)/Pilots Operating Handbook (POH), that clearly specify the policy for Autopilot use and management.

The provisions relevant to auto flight systems in the Operator's Minimum Equipment List (MEL) should specify a requirement for the system to be serviceable for night or IFR flights.

FLT 1.02.04
FLT 1.13.19

5.8: Stabilized Approaches

Aircraft operators must include type-specific stabilized approach requirements in the Operations Manual. Refer to the Flight Safety Foundation ALAR Briefing Note 7.1 (www.flightsafety.org).

Unstable approaches that do not meet standard approach tolerances are a root cause in approach and landing accidents and Controlled Flight Into Terrain (CFIT).

The stabilized approach is characterized by defined approach speeds, descent rate, vertical flight-path, and configuration through a series of defined approach gates to the landing touchdown point. The concept is primarily applicable to fixed wing operations, but IFR helicopters on instrument approaches will follow the same process.

Day VFR utility helicopter operations require less stringent approach parameters due to their operating environment. In this case, the aircraft operator will define approach criteria requiring helipad reconnaissance, wind assessment and approach techniques involving in ground effect and out of ground effect considerations.

A stabilized approach policy and the accompanying procedure should be developed for each type flown by the aircraft operator. The policy should reference the aircraft manufacturer's recommendations and encompass the nine elements of the Flight Safety Foundation's Briefing Note on Stabilized Approaches and any other aircraft specific factors required (e.g. minimum fan speeds on low bypass ratio engines, minimum propeller pitch settings, etc).

The nine key elements of the FSF briefing note are reproduced below, and the full version can be accessed at: (http://flightsafety.org/files/alar_bn7-1stablizedappr.pdf).

Recommended Elements of a Stabilized Approach

All flights must be stabilized by 1,000 feet above airport elevation in Instrument Meteorological Conditions (IMC) and by 500 feet above airport elevation in Visual Meteorological Conditions (VMC). An approach is stabilized when all of the following criteria are met:

1. The aircraft is on the correct flight path;
2. Only small changes in heading/pitch are required to maintain the correct flight path;
3. The aircraft speed is not more than VREF + 20 knots indicated airspeed and not less than VREF;
4. The aircraft is in the correct landing configuration;
5. Sink rate is no greater than 1,000 feet per minute; if an approach requires a sink rate greater than 1,000 feet per minute, a special briefing should be conducted;
6. Power setting is appropriate for the aircraft configuration and is not below the minimum power for approach as defined by the aircraft operating manual;
7. All briefings and checklists have been conducted;

8. Specific types of approaches are stabilized if they also fulfil the following: Instrument Landing System (ILS) approaches must be flown within one dot of the glideslope and localizer; a Category II or Category III ILS approach must be flown within the expanded localizer band; during a circling approach, wings should be level on final when the aircraft reaches 300 feet above airport elevation; and

9. Unique approach procedures or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.

An approach that becomes unstabilized below 1,000 feet above airport elevation in IMC or below 500 feet above airport elevation in VMC requires an immediate go-around.

evidence

The aircraft operator must document a clear policy regarding the criteria to be met, guidance and requirements for the conduct of stabilized approach.

Aircraft operators are encouraged to develop and implement a policy for mandatory, internal reporting of occurrences involving approach destabilization and associated go-around. Tracking of such reports by the aircraft operator's SMS will assist with the identification of possible specific risks or considerations that may exist in the conduct of approaches.

5.9: Mandatory Go-around Procedures

Aircraft operators must include no-fault, mandatory go-around requirements in the Operations Manual. FLT 1.02.05

The aircraft operator's SOPs must include a policy regarding the circumstances under which the conduct of mandatory and no-fault go-around is to be carried out.
The policy should contain a clear statement that the aircraft operator supports the Pilot-in-Command's decision to go-around, regardless of the circumstances. The go-around policy should be based on the content of the Flight Safety Foundation's briefing notes 'Being Prepared to Go-Around' (*http://flightsafety.org/files/alar_bn6-1-goaroundprep.pdf*) and 'Manual Go-Around' (*http://flightsafety.org/files/alar_bn6-2-mangoaround.pdf*).

Industry safety discussions often cite the all-engines-operating go-around as being one of the most poorly conducted maneuvers by flight crew. The aircraft operator should ensure that the go-around maneuver and procedure forms part of its regular check and training regime to increase crew familiarity with the maneuver.

The aircraft operator must document and approve a clear policy regarding the circumstances under which a mandatory and no-fault go-around must be carried out. Aircraft operators should also include an all engines operating go-around in their check and training regime.

Aircraft operators are encouraged to develop and implement a policy for mandatory, internal reporting of occurrences where a go-around has been conducted. Tracking of such reports by the aircraft operator's SMS will assist with identification of possible specific risks that may exist during approaches.

5.10: Terrain Awareness Warning System (TAWS)

FLT 1.11.01
FLT 2.03.14

Aircraft that fly under IFR or at night and on long-term contract must be fitted with an approved and serviceable Class A TAWS when an approved modification exists for the aircraft type. The aircraft operator must have related procedures to be followed by the flight crew in the event of an alert.

CFIT represents a major risk to aircraft operations and accident investigations show the risk of CFIT increases for flights operated under IFR or at night. The primary function of Terrain Awareness and Warning Systems (TAWS) is to reduce CFIT by increasing crew situational awareness.

The term TAWS covers all types of terrain awareness systems that include the Enhanced Ground Proximity Warning System (EGPWS). The EGPWS has a worldwide digital terrain database, which, when combined with the GPS position data, provides real-time predication and terrain avoidance capability.

Class A TAWS is required by commercial air transport aircraft and uses inputs such as position, attitude, airspeed and glideslope, which along with internal terrain, obstacles, and airport databases predict a potential conflict between the aircraft's flight path and terrain or an obstacle. Class A TAWS provides an alert to flight crew permitting them to take appropriate evasive action, and is the higher standard of the two classes.

Class B TAWS provides basic functions and whilst not predictive gives indications of imminent contact with the ground as a result of excessive rates of descent, negative climb rate or altitude loss after takeoff.

The aircraft operator must publish SOPs, consistent with the information provided in the aircraft and/or TAWS OEM data clearly specifying procedures and action to be taken by flight crew in the event of a TAWS alert.

Where TAWS is fitted to the aircraft operator's aircraft, provisions relevant to TAWS should be included in the operator's MEL and pilot training program.

6.0: Loss of Control – In-flight (LOC-I)

Crew actions inadvertently place the aircraft outside the normal flight envelope or the intended flight path and lead to an unrecoverable flight situation

6.1: Automation Policy

FLT 1.02.21

Where an Autopilot or Automatic Flight Control System (AFCS) is fitted the aircraft operator must have an automation policy that ensures appropriate use of automation to manage cockpit workload. The policy must also include procedures for manual flight control to maintain flight proficiency.

The aircraft Autopilot or Automatic Flight Control System (AFCS) provides assistance to the flight crew throughout the flight by relieving the Pilot Flying (PF) from routine manipulative tasks. The correct use of automated systems significantly reduces pilot workload enabling time for other flight management demands. The availability of an Autopilot greatly increases a pilot's ability to maintain situational awareness, respond to unanticipated changes (e.g. ATC instruction, weather conditions, etc.) and correctly respond to and manage an abnormal or emergency situation. A number of accidents have however involved incorrect mode selections on the Autopilot or AFCS.

A degradation of the cognitive skills required for forecasting flight, including recognition and handling of system failures can occur when automation is relied upon too much. The automation policy should detail the requirement for pilots to anticipate and monitor automation performance, to stay ahead of systems, and manage the aircraft and the flight accordingly.

A number of accidents have also cited the failure of flight crew manipulative skills when automated systems have failed or been disabled. Retention of core flying skills remains a key component in the safe operation of an aircraft and flight crew should regularly practice maintenance of these skills when in a low-threat environment to avoid automation dependency. The aircraft operator should have procedures that detail the conditions under which automation systems may be disengaged and manual flight undertaken.

The aircraft operator's Minimum Equipment List (MEL) should have clear requirements for the AFCS to be serviceable for night or IFR flights.

evidence

The aircraft operator must document a clear policy regarding the use, management and recovery from failure of AFCS. Their policy should stipulate the requirement for pilots to stay ahead of the automated systems and manage them accordingly. The policy should also clearly describe the meteorological and operational conditions during which the crew are allowed to manually handle the aircraft. The aircraft operator's documented procedures must require the use of AFCS during night and IFR flight.

Details of the aircraft operator's automation systems explained in the aircraft operator's Operations Manual, for each aircraft type and system, should be consistent with information provided by the manufacturer in the approved AFM or POH.

The operator's syllabus of training must include elements applicable to AFCS use, management and actions in event of failure. The syllabus should also include the Human Factors elements associated with AFCS such as issues with prolonged monitoring and automation surprise. Training records should demonstrate that requirements of the AFCS training have been appropriately applied in initial and recurrent training of pilots, and in the ongoing evaluation of pilot competency.

6.2: Multi-crew Operations

FLT 1.02.01
FLT 1.02.02
FLT 1.02.03
FLT 1.13.15

Where multi-crew operations are conducted, procedures outlining the duties and responsibilities of all flight crew members must be prescribed by the aircraft operator.

The clear identification and description of individual roles, in particular Pilot Flying and Pilot Monitoring roles, is important to ensure good crew cooperation, awareness and challenge. The safety enhancement of utilizing multi-crew operations will only be fully realized if all crew members meet an established operational standard and perform their duties in a predictable and standardized manner.

Aircraft operators who mostly fly single-pilot operations must ensure that multi-crew procedures are understood and applied, especially when operating an aircraft normally certified for single-pilot operations but using a two-pilot crew.

evidence

The aircraft operator must have SOPs that are consistent with information provided in the manufacturer's Aircraft Flight Manual and should detail roles and responsibilities of those involved in multi-crew operations; including, procedures for establishing and confirming operational responsibilities in the cockpit as well as procedures for transferring responsibilities at defined phases of flight.

Associated flight records should be able to confirm that flights conducted at night or under the IFR are crewed by two appropriately qualified pilots in accordance with the aircraft operator's policy. Flight crew files and rostering records would confirm implementation.

Training records should demonstrate that crew have been trained in accomplishment of the roles and responsibilities they have, as well as training in the human factors of multi-crew operation and decision making.

For aircraft that are certified single-pilot and where the aircraft operator chooses this option for day, VFR or non-BMO flights, a separate set of SOPs should be in place accompanied by appropriate training and checking for the single-pilot role.

UK CAA Paper 2013/02 Monitoring Matters: Guidance on the Development of Pilot Monitoring Skills

Flight Safety Foundation: A Practical Guide for Improving Flight Path Monitoring

6.3: CRM/ADM Training

All flight crew and cabin crew must have successfully completed Crew Resource Management (CRM) or Threat and Error Management (TEM) training at intervals not exceeding two years. Completion of an Aeronautical Decision Making (ADM) course is acceptable for approved single-pilot operations.

FLT 2.02.01
FLT 2.02.02
FLT 2.06.04

CRM focuses upon the management of the resources and skill-sets provided by all crew members to enhance safety through goal setting, teamwork, awareness and both proactive and reactive feedback.

The skills promoted by CRM training provide a significant defense against threats to safety that routinely present within the aviation system and help defend against human error and its consequences. Training the crew in threat and error management reinforces that threats and errors are a part of everyday aviation operations that must be managed to achieve safe outcomes.

Research indicates there are links between CRM and TEM making it acceptable for crew to successfully complete either course at regular intervals. Where the aircraft operator flies aircraft that include cabin/SAR crew, these staff should be included in joint CRM training courses and associated exercises.

While many of the concepts focused on in CRM will apply to single-pilot operations, they are most beneficial to personnel involved in multi-crew operations. An ADM course is a recommended alternative for pilots who are engaged solely in single-pilot operations. ADM will encourage pilots to use a systematic decision making process to consistently determine the best course of action in response to a given set of circumstances.

evidence

Syllabi of training for CRM, TEM or ADM courses (as applicable) should be published in the Operations Manual and should include all assigned flight, cabin, and operational crew. The processes for conducting periodic training and ongoing evaluation should also be documented.

Associated crew training records should confirm that these training requirements have been applied in the induction training of new crew and are repeated periodically at intervals not exceeding two years (or as required by the responsible regulatory authority, if more frequent training is required).

6.4: Flight Data Monitoring

When available for the aircraft type, long-term contracts that are for a duration of two years or greater, and which specify individual aircraft must have operational Flight Data Monitoring capability that is routinely used to assess operational approach and landing competencies.

FLT 1.02.15

Flight Data Monitoring (FDM) should be an important component of an aircraft operator's SMS used to monitor and analyze the safety and quality of flight operations.

Data may be downloaded from the aircraft's FDR (e.g. by addition of a Quick Access Recorder or a wireless data transmission system), by data card recording from certain modern glass cockpit designs or, for smaller aircraft that lack an FDR, by addition of a dedicated FDM recorder with some integral sensors.

Baseline flight data parameters are established following an initial data gathering exercise. Variations from the baseline are identified through a flight data monitoring computer analysis program.

Examples of FDM use include: determination of whether an unstable approach was an isolated event or symptomatic of a wider problem due to environmental influences, a weakness in ATC procedures or improper flight management.

FDM is an effective tool for identifying possible systemic issues (e.g. procedures, training, specific airfields etc) or improper techniques. Of particular significance is the detection of adverse trends that require revision of the aircraft operator's training or procedures. An effective program will encourage consistent adherence to procedures and their continuous improvement while deterring any inappropriate techniques.

FDM and LOSA observations can be analyzed collectively for added insight.

evidence

Where FDM is available to an aircraft operator, the operator's Safety Management System manual should detail the process for integrating FDM into the SMS. The process for regular reviews of the data and an investigative process for out of tolerance events should also be clearly documented.

Aircraft operator's records should confirm that data is being analyzed and that any events outside of normal operational parameters are investigated. They should also demonstrate that appropriate actions are determined and are verified as being carried out and effective.

UK CAA CAP739 Flight Data Monitoring

Helicopter FDM Industry Best Practice document *(www.hfdm.org)*

6.5: Line Operations Safety Audit (LOSA)

ORG 3.12.01
ORG 3.12.02
ORG 3.12.03
ORG 3.12.04
ORG 3.12.05
ORG 3.12.06

For long-term contracts greater than two years, the aircraft operator must have a LOSA program as part of its SMS. This must be a structured program, using trained observers to collect data on routine flights, on a de-identified non-punitive basis, on flight crew response to threats and errors. Use of systems that use video and other data capture techniques may be used for single-pilot and/or small aircraft operations where carrying an external observer is not considered practical. The data must be analyzed and appropriate action plans implemented.

The LOSA program need not involve observations of the contracted operation if an appropriate sample is taken of comparable operations (e.g. fixed wing flights to a mine site with similar aircraft types, flying to similar procedures in a similar environment.) The LOSA observations may be conducted periodically, but at least every two years.

See Flight Safety Digest Volume 24 No 2, Feb 2005.

LOSA complements FDM but also provides context and insight into the effectiveness of training and procedures that would not otherwise be evident from FDM alone. It also provides an independent means to verify the effectiveness of CRM training and enable the continuous improvement of CRM.

The company may need to free space for the observer on routine flights when a jump seat is not available. It may be necessary to modify the aircraft (such as a medium helicopter) temporarily to reverse a rearward facing passenger seat to give the necessary visibility (where a suitable modification is certified).

evidence

The aircraft operator must document a policy regarding the LOSA process that applies to structure of the program, and collection and analysis of data. The policy should include the voluntary nature of the program, appropriate Just Culture elements and safety and security of data.

Aircraft operator's records should confirm that data is being analyzed and that any events outside of normal operational parameters are investigated. They should also demonstrate that appropriate actions are determined and are verified as being carried out and effective.

Flight Safety Digest Volume 24 No 2, Nov – Feb 2005

ICAO Doc 9803 – Line Operations Safety Audit

7.0: Incorrect Loading

Incorrect loading of passengers and/or their lack of proper safety awareness results in an aircraft accident

Loading errors can present a major hazard to flight safety and there have been numerous incidents where control of aircraft has been either lost or compromised, due to incorrect loading.

Aircraft loading must be conducted in a way that ensures the specified maximum allowable weights are not exceeded and that the load distribution results in the center of gravity being in, and remaining within, the permitted flight envelope for all stages of the intended flight.

It is crucial that the flight crew are aware of the aircraft's weight and center of gravity so that the aircraft equipment can be configured appropriately for takeoff and performance calculations accurately completed. This is important to ensure that the aircraft can be rotated at the correct indicated airspeed with full control of the aircraft being retained and that any limitations imposed by the runway length and obstacles in the takeoff path are determined and complied with.

The process of loading an aircraft is quite complex and requires coordination between all parties involved in the process. To help guard against common loading errors and coordination break downs that can lead to errors, aircraft operators and companies contracting aviation services must develop and comply with a system of checks and cross checks by load personnel and flight crew members.

7.1: Passenger Weight

GRH 1.04.01
GRH 1.04.05

For aeroplanes with less than 30 passenger seats and for all helicopters, actual body weight (including hand luggage) must be used.

Standard weights based on seasonal averages may be used for aeroplanes with 30 passenger seats or more if within regulatory or operator requirements.

The use of standard passenger weights, as a means of determining the overall weight of passengers to be carried, relies on statistical data and the standard distribution of actual body weights amongst the general population. The potential for overloading an aircraft with only a small number of passenger seats is high if standard passenger weights are used.

The exception to this is for business jet aircraft, that operate with high power margins and a fewer seats relative to their Maximum All Up Weight. In these circumstances it is acceptable practice to use standard weights.

Where standard passenger weights are used, they must be determined and used in accordance with procedures acceptable to the responsible regulatory authority. Where approved for use by the responsible regulatory authority, standard passenger weights will be published, and/or an alternative procedure will be applied allowing aircraft operators to conduct a survey of their own passenger base to determine the standard passenger weights. The last point is critical where operations are conducted on a regional basis and differing body masses exist with differing ethnic populations.

Where approved by the applicable regulatory authority and the Competent Aviation Specialist, examples of alternative procedures include:

- The construction of limiting case scenarios with associated load plans to support the approved loading procedures;
- The use of compartment weights on larger aircraft; and
- An estimate of body weight (for business jet operations).

Actual weights should be derived from calibrated scales provided by either the company or the aircraft operator. The Pilot-in-Command is responsible for ensuring that the aircraft is loaded within its center of gravity and weight limits at all times.

evidence

The aircraft operator's documented procedures should include the method to determine the weight of passengers to be carried on each flight.

Such procedures must require determination and use of actual body weight (including hand luggage) for passengers to be carried on fixed wing aircraft with a seating capacity of less than 30 seats, and all helicopters.

Where standard passenger weights are to be used, the aircraft operator should document the process used to determine those weights and be able to demonstrate the approval of the loading system by the applicable regulatory authority.

7.2: Cargo Weight and Loading

GRH 1.01.05
GRH 1.02.01
GRH 1.02.02
GRH 1.04.03
GRH 1.04.04

Weigh baggage and cargo separately and include details on the manifest.

If cargo is carried inside the passenger compartment during passenger carrying operations, secure it using nets and straps and place it in front of the passengers where practical. Do not obstruct normal or emergency exits.

Appropriate measures must be taken to protect all baggage and cargo from the effects of rain prior to loading on-board the aircraft. While this is good practice to prevent damage to the baggage and cargo, it is important that exposure to rain does not significantly increase the weight of items to be carried.

While the carriage of cargo in the passenger compartment during passenger carrying operations is to be generally discouraged, it is acknowledged that this may be necessary for some aircraft types. Where an aircraft operator has obtained agreement from the company to do this, guidance must be readily available to flight crew and loading personnel regarding the area(s) in the cabin that can be used and the means by which the cargo will be restrained. It is critical that only aviation certified restraint equipment is utilized for securing cargo.

evidence

The aircraft operator's documented procedures should detail the requirements and processes that are to be used to determine the weight of all baggage and cargo that is to be carried on each flight. This includes approval of the loading system in use.

Where an aircraft operator has obtained agreement from the company for cargo to be carried in the passenger compartment during passenger carrying operations, the approval should be included in the Operations Manual. The aircraft operator's procedures should also detail the locations in the cabin that may be used and the method by which cargo will be restrained.

7.3: Load and Trim Calculations

FLT 1.03.01
FLT 1.03.03
FLT 1.03.04

Prior to takeoff, the Pilot-in-Command must ensure that fuel and oil requirements are correct, and that weight and center of gravity limits of the aircraft have been calculated and are within limits for flight. The Load and Trim calculations may be accomplished by any approved means, but the details must be available in the cockpit at all times.

The aircraft operator's load management procedures should specify the calculation methods acceptable, the center of gravity limits and the requirement for the Pilot-in-Command to authorize the final load calculation. An approved load-sheet (or approved alternative) must be completed prior to departure of the aircraft on each stage of every flight. Where a flight involves a number of stages, a supplementary load sheet reflecting the loading at the initial stage and accounting for all changes in the load may be used for each subsequent stage on the same day.

The aircraft operator should retain records associated with flight for a period of 90 days.

The aircraft operator's procedures should detail the requirements and processes to determine the aircraft weight and balance for each flight, and require a copy of the associated load sheet to be carried on the aircraft and be available on the flight deck at all times during flight.

Documented procedures should also detail requirements for retention of load sheets and other documentation related to the weight and balance calculation for each flight for a minimum period of 90 days.

7.4: Manifest

GRH 1.01.02
GRH 1.01.07

A passenger manifest that accurately reflects the occupants of an aircraft must be raised for each flight or, where applicable, each sector. The manifest must record the full name of each passenger and a copy must be accessible by flight following personnel at all times.

The aircraft operator's load management procedures must ensure that a passenger manifest is raised for each flight or each sector of a flight where passengers change. The load management procedures should require a check of the names of passengers allocated a seat on a flight against the list of personnel cleared for travel on a flight by the company.

It is important that the passenger manifest compiled for each flight accurately reflects the occupants of an aircraft when in-flight to provide full accountability. The aircraft operator's procedures must ensure that a copy of the completed passenger manifest is readily accessible by flight crew and by flight-following personnel at all times. The procedures must also ensure that a copy of each completed passenger manifest is retained on file for a minimum period of 90 days after the completion of the flight.

The aircraft operator's documented procedures should detail the requirements and processes that are used to compile a passenger manifest for each flight. Such procedures should require that passenger manifests contain the name of each passenger carried, the places of their embarkation and destination and clear details of the flight to which the manifest relates such as the date, estimated time of departure, flight route, and where applicable, flight number.

Passenger manifests should be retained with load sheets and other associated loading documentation and should be available in accordance with the aircraft operator's documented records retention procedures.

FLT 1.02.06
FLT 2.03.11
FLT 2.03.12
FLT 2.06.05
GRH 1.03.01
GRH 1.03.02
GRH 1.03.03
GRH 1.03.04
ORG 1.02.04

7.5: Dangerous Goods Cargo (Hazardous Materials)

Comply with current International Air Transport Association (IATA) requirements (or similar requirements such as Title 49 of the Code of Federal Regulations) associated with Dangerous Goods Regulations. The aircraft operator must have appropriate procedures and trained personnel for the carriage and acceptance of dangerous goods. All crew must complete dangerous goods awareness training at least every two years.

Dangerous goods are solids, liquids, or gases that are:

- Explosive substances;
- Goods which, by reason of their nature, are liable to endanger the safety of an aircraft or persons on-board an aircraft; and/or
- Goods that regulations declare to be dangerous goods.

Dangerous goods may only be carried if an aircraft operator has met the specific training, documentation, record keeping and incident reporting requirements of the responsible regulatory authority.

The safe and successful application of regulations for the transport of dangerous goods by air is dependent on all individuals being aware of the risks involved and having a detailed understanding of the regulations. This level of awareness can only be achieved through the completion of initial and recurrent dangerous goods training programs for all personnel that may be involved in the handling of cargo that has been consigned for carriage on an aircraft. This includes baggage checked-in or carried on-board by passengers.

Company employees who are involved with the consignment or acceptance of cargo and baggage should undertake applicable DG training. The aircraft operator and the company must implement processes to monitor and confirm that training requirements are met.

evidence

The aircraft operator must be able to demonstrate approval from the responsible regulatory authority for the carriage of dangerous goods (if applicable).

The aircraft operator must have a Dangerous Goods Manual (or equivalent document) to provide all personnel with the instructions and information that is necessary to enable them to safely perform the task of handling and carrying dangerous goods. The manual must contain information that is required to ensure that DGs are only carried if packed, loaded and transported in accordance with responsible regulatory authority approvals and current IATA Dangerous Goods Regulations (or equivalent).

The aircraft operator must have a documented process that details which personnel are required to be qualified in the packaging, consignment and acceptance of DGs (as applicable). The aircraft operator should establish a tracking system (either manual or electronic is acceptable) detailing staff currency with respect to DG training. The tracking system should include a forward looking function to ensure that DG training events are planned with sufficient notification to meet the 24 month expiry requirement.

Retained loading documentation should be held for a minimum of 90 days. The documentation should be available in accordance with the aircraft operator's documented procedures. In instances where dangerous goods have been carried, the documentation prescribed by the aircraft operator's Dangerous Goods Manual (or equivalent document) must be made available.

7.6: Passenger Briefing

FLT 1.09.01
FLT 1.09.03
FLT 1.09.04
FLT 1.09.05
FLT 1.09.06
FLT 1.09.07
FLT 1.09.11
FLT 1.13.10
FLT 1.13.11

Passengers must be briefed on emergency procedures and safety matters prior to flight, including the following requirements:

- ***That there is no smoking during the flight or around the aircraft and apron area;***
- ***A general description of the aircraft and specific avoid/danger areas;***
- ***The location of non-smoking and fasten seatbelt signs and briefing cards;***
- ***The use of seat belts and shoulder harnesses;***
- ***The location and operation of oxygen masks, if applicable;***
- ***The means of communication between crew and passengers;***
- ***The brace position;***
- ***The location and use of normal and emergency exits and all life-saving equipment;***
- ***Instructions on the use of Personal Electronic Devices (PEDs); and***
- ***Passengers must be briefed after any sudden descent, return to base, or any other event that may cause concern.***

Regardless of previous flight experience, passengers maximize their chance of survival if they receive an appropriate pre-flight safety briefing, retain the information passed to them and can apply it in an emergency situation.

It is for this reason that all regulatory authorities require that a comprehensive safety briefing be completed prior to each flight.

A safety briefing and/or demonstration should be provided to passengers prior to each takeoff and can be completed through personal briefing and actual demonstration or by means of a video presentation. For high capacity jet operations, the regulatory approved pre-flight safety demonstration meets the above requirements.

In resource sector operations where multi-sector flights utilizing the same passenger complement and crew occurs (e.g. exploration activities), one safety briefing for a 24 hour period is sufficient to satisfy the intent of this control.

evidence

The aircraft operator's procedures should specify the requirements that are to be followed to ensure that all passengers are properly briefed on emergency procedures and other matters of importance to their personal safety before flight. The content and delivery of the briefing will demonstrate that the above requirements have been met.

7.7: Multi-language Briefing

FLT 1.09.10

When the first language in the area of operations is not English, the aircraft operator must provide emergency exit decals and briefings in the local language as well as English.

It is important to ensure that all pre-flight safety briefings and printed safety material that is provided to passengers is presented in both English and the language(s) most applicable to the majority of passengers carried on a flight.

evidence

The aircraft operator's documented procedures should ensure that where English is not the first language of passengers, decals, passenger briefings and passenger-briefing cards are provided in English and the local language. The content and delivery of the briefing will demonstrate that the above requirements have been met.

8.0: Collision on Ground

An aircraft and an object collide on the ground resulting in an accident

The term 'collision on ground' covers a range of safety scenarios relating to damage arising from aircraft colliding with obstacles while maneuvering on the ground, or the collision of people or equipment with a stationary aircraft (including propellers and rotors that may be in motion).

Based on data developed by the International Air Transport Association (IATA), the FSF estimates that 27,000 ramp accidents and incidents – one per 1,000 departures – occur worldwide every year. About 243,000 people are injured each year in these accidents and incidents; the injury rate is 9 per 1,000 departures.

Take appropriate measures to address and minimize the possibility of aircraft being involved in a collision on the ground. Such measures start with the design and layout of the airfield or landing area and extend to controlling the movement of personnel and equipment around aircraft movement areas.

Particular care needs to be taken in situations where an aircraft is being readied for departure or arrival whilst departures of multiple aircraft are occurring.

The Flight Safety Foundation website contains information on ground incident prevention at: *http://flightsafety.org/archives-and-resources/ground-accident-prevention-gap*

8.1: Passenger Terminal Area

Company owned and operated airfields must have a waiting area for passengers offering security, basic amenities, protection from the elements and a barrier from the aircraft movement area. Incoming and outgoing passenger routes must be designated.

The company must provide facilities and features and implement procedures at airfields or landing sites under their control to ensure the safety of persons using those facilities. Such facilities and features must address the safety, security and operational practices related to the control of access to, and movement on, aircraft movement areas.

Facilities and features provided in terminal areas and their associated procedures should ensure the efficiency of passenger processing by maintaining separation, where possible, between incoming and outgoing passengers. This is particularly important in locations where specific procedures such as passenger security screening are required.

The company should have documented information regarding the facilities available and the procedures that are to be followed for each airfield or landing site under their control. All relevant information should be provided to aircraft operators so that it can be incorporated into their site-specific SOPs, as required. Appropriate safety information must be provided in passenger waiting areas.

8.2: Designated Freight Areas

Company owned and operated airfields, helipads and helidecks must have a designated and secure freight area that provides a controlled environment clear of the aircraft movement area and public thoroughfare.

The company must provide segregated facilities at airfields or landing sites under their control and implement supporting procedures to be used for the acceptance, storage and/or consolidation of cargo. Such areas should be located clear of the aircraft movement area and positioned to avoid the effects of aircraft prop-wash, jet blast or helicopter down-wash.

Designated freight areas should also be positioned in locations that are away from public thoroughfares and provide for restricted access to enhance safety and security.

The company should have designated areas to be used for the acceptance, storage and/or consolidation of cargo for each airfield or landing site under their control. All relevant information should be provided to aircraft operators so that it can be incorporated into their site-specific SOPs, as required.

The storage location should be adequately designated.

8.3: Passenger Control

GRH 1.01.08
GRH 1.01.09

A designated Passenger Control Officer (PCO) or Helideck Landing Officer (HLO) who is in a position to communicate with the crew at all times must control all passenger movements to and from the designated aircraft movement area. The PCO can be provided by the company or aircraft operator, and may be a crew member in a multi-crew operation.

The PCO and HLO must be identified using a distinguishing vest if they are not a crew member of the aircraft.

Appropriate measures must be taken to provide adequate control of all passenger movements to and from designated aircraft movement areas. The company and aircraft operator must understand whose responsibility it is to provide a PCO or HLO for any operation and what roles and responsibilities are to be fulfilled by a person carrying out this function.

The aircraft operator and/or company should publish a syllabus for the initial and recurrent training of staff appointed to PCO or HLO positions and detail the process for certification of competency.

If the company is responsible for passenger control to and from designated aircraft movement areas, the personnel must be trained and equipped with all necessary PPE including a high visibility vest with appropriate markings.

Procedures should detail who is to fulfil the role of PCO or HLO at each airfield or landing site and contain all associated roles and responsibilities.

evidence

The aircraft operator's operational risk assessment process should consider any passenger control requirements that are to apply at each airfield or landing site used prior to the commencement of operations.

The aircraft operator's SOPs should detail the passenger handling procedures where the PCO duties are carried out by a flight crew member.

8.4: Ground Procedures

The Operations Manual must include requirements on ground handling and the maneuvering of aircraft. GRH 1.01.01

To ensure the safety of aircraft, equipment and personnel, the aircraft operator must document procedures relevant to the ramp or ground handling and maneuvering of each applicable aircraft type, expanding on the information provided in the aircraft manufacturer's approved AFM and/or Ground Handling Manual (where available).

Such procedures should be developed to avoid errors that can occur during ground handling processes and create unsafe situations that may lead to accidents or incidents either directly involving ground handling personnel or the aircraft.

The aircraft operator's documented procedures must be made available to all personnel who are allocated duties associated with ramp or ground handling of aircraft.

evidence

The aircraft operator should document procedures relevant to the ramp or ground handling and maneuvering of each applicable aircraft type. Where necessary, such procedures should detail any specific requirements or procedures that may apply at each airfield or landing site that is used.

8.5: Pilot at Controls

A pilot must remain at the controls of an operating aircraft under power and whilst on the ground at all times. The controls must not be left unattended with the aircraft under power in any circumstances, even to assist in activities such as hot refueling, load attachment or passenger management. The transfer of passengers whilst the rotors are running for helicopter operations must be supervised by a designated PCO or HLO. FLT 1.03.07

Loading or unloading helicopters with the rotors turning introduces the risk of personnel and obstacles coming into contact with any of the dynamic components of the helicopter.

The aircraft operator must document the circumstances under which loading and/or unloading operations for helicopters with the rotors turning is authorized to occur. This should be accompanied with an operation specific risk assessment. The associated procedures should require that:

- A pilot must remain at the controls at all times and is only to be engaged in essential cockpit duties associated with the identification of external hazards and monitoring of passenger movement around the aircraft;
- Passengers are provided with an appropriate briefing prior to approaching the helicopter; and
- Passengers are to be escorted to/from the helicopter by an appropriately trained and authorized person (either the co-pilot or HLO/PCO).

evidence

The aircraft operator should document the circumstances under which loading and/or unloading operations for helicopters with the rotors turning is authorized to occur, and the training requirements and procedures that are to apply to safely undertake the operation.

The aircraft operator's documented procedures are to be made available, as applicable, to all personnel who are allocated duties associated with these operations.

The company and aircraft operator should have an audit and review process to ensure that all loading and unloading operations involving helicopters with rotors running is conducted in accordance with published procedures.

8.6: Parking Apron

For all company owned and operated airfields, the parking apron area must be assessed by the aircraft operator as being suitable for their type of aircraft. Consider other transient aircraft traffic, helicopter operations, refueling, and the Pavement Classification Number (PCN). For long-term operations where practical, taxi lines specific to the contracted aircraft type must be painted in the apron area for obstacle-clearance maneuvering purposes.

Aircraft apron areas must be provided as required on airfields that companies own or operate to permit the loading and unloading of passengers and cargo as well as the servicing of aircraft. Apron areas must be of sufficient size to safely permit the handling of aircraft at the maximum anticipated traffic density and to accommodate the expected requirements for transient and longer term parking of aircraft. Consider providing suitable area(s) that allow for the conduct of safe and efficient de-icing/anti-icing operations, if required by the location.

Each part of an apron should be constructed to give a pavement load bearing capacity that is capable of sustaining the effects of loads imposed by the aircraft it is intended to serve. Consider that some portions of the apron may be subjected to a higher density of traffic and, as a result of slow moving or stationary aircraft, to higher stresses than a runway.

Apron marking requirements will be determined primarily by the size of the aircraft being accommodated and the level of regulatory authority certification that is to apply to the airfield. However, sufficient guidance markings should be provided to minimize the risk of an aircraft colliding with an obstacle on the ground, and to facilitate the safe and efficient movement of persons and equipment around aircraft on the apron areas.

evidence

The aircraft operator's Safety Management System manual should detail the requirement for the assessment and management of operational risks that form an integral part of the planning and execution of any change within the operation. The aircraft operator should document the requirement and procedures to be followed for conducting airfield assessments prior to commencing operations to a new airfield. Such procedures must provide for the assessment of parking apron areas and their suitability for the intended operation. Documented records of assessments of airfields and associated apron areas that have been undertaken should be available for review.

8.7: Perimeter Fence

Construct a perimeter fence around all company owned and operated airfields to prevent access by livestock, other animals and traveling pedestrians.

A perimeter fence or other suitable barrier is intended to prevent:

- Access to the movement area by animals large enough to be a hazard to aircraft; and
- Unauthorized personnel having access to non-public areas of the aerodrome.

The company should appoint a person responsible for the performance of aerodrome serviceability inspections and reporting functions. The appointed person must ensure that the aircraft operator is advised of possible or known changes to airfield conditions that may present a hazard to aircraft operations, including circumstances where the perimeter fence is not controlling the hazard.

Inspections of aerodrome serviceability must ensure that perimeter fencing and operational areas of the aerodrome are checked for damage, open gates or signs of attempted or actual entry by either animals or humans. The company should establish procedures that are to be followed in such circumstances, including the completion of a daily checklist, which records any such activity.

The company should document in the airfield operations procedures manual (or another suitable document), requirements for the conduct of routine inspections of airfield facilities and the role and responsibilities of persons appointed to fulfil that function. The company's documented airfield procedures and requirements should also provide for timely communication of relevant information to the aircraft operator.

8.8: Airfield Control

All company owned and operated airfields must have personnel who are responsible for overseeing and managing the airfield and operating standards. Responsibilities include having a basic understanding of the local aviation regulatory system, certification requirements of the airfield and daily airfield reporting officer duties.

Personnel should be appointed that are responsible for the oversight and management of the airfield and operating standards of airfield facilities. These functions must be documented by the company and will include:

- Inspections of aircraft movement areas and checking surface conditions and the possible presence of foreign objects;
- Inspections of aerodrome markers and markings, lighting, wind direction indicators and ground signals;
- Monitoring obstacles that may infringe the takeoff, approach and transitional surfaces;
- Inspections to determine if any birds or animals are near the aircraft movement areas;
- Inspections of measures, such as perimeter fencing, that are in place to control the inadvertent entry of persons or animals into the movement area; and
- Management of airfield works to ensure the safety of aircraft operations and aerodrome personnel.

Documented procedures for conducting daily airfield serviceability inspections prior to the first aircraft movement, after significant wind or rain storms, or when specifically requested by the aircraft operator are required. The use of checklists is encouraged and a written record of the completed inspection and any defects discovered is required.

A person appointed to carry out aerodrome serviceability inspections must be trained to apply all of the documented requirements.

The aircraft operator must be advised of possible or known changes to airfield conditions which may present a hazard to aircraft operations.

The company should document in the airfield operations procedures manual (or another suitable document), requirements for the oversight and management of the airfield including the role and responsibilities of persons appointed to fulfil that function. The company's procedures must also mandate timely communication of relevant operational information to aircraft operator.

9.0: Collision in Air

An aircraft and object collide in air resulting in an accident

The threat of collision in the air most commonly refers to another aircraft however it also includes birds. The significance to resource sector aviation operations, particularly during development and construction phases, is illustrated by multiple aircraft from different aircraft operators all utilizing the one airstrip and quite often in uncontrolled airspace. Appropriate controls must be in place and adhered to for the risk to be well controlled.

The AAWHG website contains information on wildlife management at: *http://aawhg.org/publications-and-tools/* ***See also: Airports Council International - Wildlife Hazard Management Handbook hosted on the ICAO website.***

9.1: Cruising Altitudes

Comply with the ICAO cruising altitudes for both VFR and IFR flight unless circumstances, such as weather, require non-standard procedures. Where known bird migratory routes are identified, make practical attempts to plan cruise altitudes above 3,000 feet above ground level.

The aircraft operator's SOPs should require flights to be conducted, unless otherwise assigned a different altitude or flight level by an by the appropriate ATC authority, at an altitude or flight level appropriate to the track being flown as specified in the tables of cruising levels provided in Appendix 3 of ICAO Annex 2 – Rules of the Air.

Adherence to the specified tables of cruising levels in accordance with the direction of flight improves separation from conflicting traffic during cruising flight and reduces the risk of collision.

While the risk of in-flight collision with birds cannot be eliminated, it is recommended that strategies be considered by flight crew to minimize exposure to this threat when operating in areas of known migratory routes. Statistics reveal that the risk of birdstrike significantly reduces when aircraft are operated at altitudes above 3,000 feet above ground level.

evidence

The aircraft operator should document a cruise policy that requires flights to be conducted at an altitude or flight level appropriate to the track being flown as specified in the tables of cruising levels provided in Appendix 3 of ICAO Annex 2 – Rules of the Air (unless otherwise assigned by the appropriate ATC authority).

Where applicable, the aircraft operator's policies should also promote avoidance of areas of known or expected significant bird activity (if possible). Where aircraft are required to be operated through or over these areas, cruising flight at altitudes above 3,000 feet above ground level are to be recommended where practicable.

9.2: Radar Controlled Airspace

The Pilot-in-Command must consider the use of Air Traffic Controlled or Monitored airspace when determining cruising altitudes utilized during flight.

Maximizing the extent to which aircraft are operated in controlled airspace optimizes the safety benefits provided by radar-controlled traffic separation.

The aircraft operator's SOPs should outline the requirement for flight crew to consider operating aircraft at an altitude or flight level applicable to the track that will ensure that the flight is operated in radar controlled airspace.

9.3: Airfield Bird Control

Conduct active bird control at all company owned and operated airfields when required and record the presence of birds periodically. Where possible, birds must be dispersed or removed in accordance with local wildlife regulations. Seeding grass, open waste disposal and water ponds must be restricted to remove attractions for birds.

Where bird activity exists, aircraft operators must minimize the risk of bird strike during all operations.

Individual airfields attract birds for a variety of reasons resulting in differing bird control challenges at every location. Variables such as migratory routes, seasonal changes, bird species, local feeding influences, availability of water, freshly cut grass and close proximity of refuse sites will all play a part in the presence of bird life. The availability of nesting habitats provided by hangars compounds the problem.

Airfield bird control programs require consideration of the following controls:

- Airfield habitat management: Management of grass and surface water (including transient accumulations), exclusion of roosting opportunities in buildings and trees within the airport perimeter;
- Airfield locality habitat review: An assessment of bird attractants or related bird activity within the ICAO defined 13km bird circle around the airfield, paying particular attention to sites that have the potential to directly affect the operational safety of aircraft such as in the approach and departure corridors; and
- Active on-airfield control systems: Bird activity monitoring and/or implementation of active bird deterrence methods.

The key to any successful airfield bird control program is habitat control which involves making the airfield less attractive to birds. This requires an understanding of why a particular species of bird may be present in the area and around the aerodrome.

In those cases where the problem is significant, specialist wildlife and bird control advice should be sought by the company.

The company should ensure that all reports of birdstrikes are relayed back to airfield management from the aircraft operator. Where applicable, a bird hazard management plan should be documented as part of the airfield management documentation.

The aircraft operator should document the requirement to inform airfield management and the relevant owner, of the details of any bird hazards that are known to be present and any procedures that are to be applied as part of the bird hazard management plan.

9.4: Traffic Collision Avoidance System (TCAS)

Aircraft capable of being flown at night, under the IFR and on long-term contract must be fitted with a TCAS. The aircraft operator must have a procedure describing the action to be taken for TCAS advisories.

FLT 1.11.02
FLT 2.03.14

While ATC procedures and the 'see and avoid concept' will continue to be the primary means of ensuring aircraft separation, the provision of TCAS (also known as Airborne Collision Avoidance System or ACAS) is a significant control to prevent airborne collision. This is particularly true in degraded visual environments of night and instrument conditions.

For the control to be effective, flight crew must respond to the TCAS in a timely and predictable manner compatible with the system design. Correct response is dependent on the correct application of the aircraft operator's SOPs and the effectiveness of initial and recurrent training in TCAS procedures.

evidence

The aircraft operator must develop clear procedures for the use of TCAS equipment and the specific check and training requirements applicable to the equipment used. The documented procedures must complement the information provided in the aircraft AFM, POH and OEM instructions.

The check and training program must cover elements required by the responsible regulatory authority or as recommended by ICAO.

Pilot training records must confirm that requirements of the training program applicable to the use of TCAS have been appropriately applied in the initial and recurrent training of pilots and the ongoing evaluation of pilot competency.

9.5: High Intensity Strobe Lights

Aircraft on long-term contract operating in airspace without radar coverage and where the potential for conflicting traffic is assessed as being high, must have high intensity strobe or pulse lights fitted.

MNT 3.01.03

Regardless of the type of aircraft flown or the classification of airspace being operated in, it is the responsibility of all flight crew to avoid in-flight collisions with other aircraft through visual contact. Although a simple premise, the 'see and avoid' concept is the last line of defence.

The provision of high intensity strobe or pulse lights on aircraft reduces the risks of in-flight collision by making an aircraft a positive visual target to other flight crew at earlier stages of a potential conflict. As an added control to the final defence, this is particularly true when an aircraft is being observed against terrain, a dark sky or in conditions of low light.

evidence

The aircraft operator must document a procedure for the use of aircraft lighting and where applicable, this procedure must be reflected in the flight check system for each aircraft type. Aircraft fitted with conforming light systems should be regularly checked for correct functioning of the lights.

10.0: Structural or Mechanical Failure

Structural or mechanical failure of the aircraft results in loss of control and an accident

Certification of aircraft and their component parts by aviation regulators ensures that commercial and general aviation aircraft meet the highest safety standards, from the time of their initial design to retirement from service. The certification process ensures that the particular design of an aircraft, engine, or other component has demonstrated compliance with current, applicable regulations and successful completion for an aircraft design results in a Type Certificate being issued.

During the type certification process, the aircraft manufacturer will develop the maintenance program that applies to that aircraft type to support and ensure the continuing airworthiness of the aircraft design.

Once the aircraft has entered into service, it is subject to operational wear and tear that may cause performance degradations or lead to structural or mechanical failure. The approved maintenance program must be followed to ensure the continuing airworthiness of the aircraft and to maintain their aircraft's airworthiness certificate.

10.1: Single-engine Aircraft

Single-engine aircraft must only be used for passenger flights in a non-hostile environment under day visual conditions.

All single-engine aircraft used for passenger carrying operations must have turbine engines.

The greater reliability of turbine engines over reciprocating engines is well documented and results in less risk of experiencing an engine failure when operating turbine powered aircraft.

A single-engine aircraft having experienced an engine failure will require a forced landing area within its immediate vicinity. If this occurs over hostile terrain, the safety, recovery or survivability of the occupants will not be assured.

Use of turbine powered, single-engine aircraft is considered acceptable for passenger carrying operations during day visual conditions over non-hostile environments.

10.2: Multi-engine Aircraft

Multi-engine aircraft must be capable of sustaining a 1% net climb gradient until reaching the lowest safe altitude, or a point 500 feet above the terrain in the area of operations, with One Engine Inoperative (OEI). Multi-engine aircraft must be used if:

- ***Operating in a hostile environment and carrying passengers;***
- ***Any portion of the flight will be in instrument (non-visual) or night conditions; and/or***
- ***Operating on extended over water flights.***

Engine reliability continues to increase with advances in material and design technology. However, engines will continue to fail, albeit at an increasingly lower frequency and therefore use of multi-engine aircraft will provide a level of redundancy if an engine fails.

What is not often realized is that some multi-engine aircraft when operating at (or near) their performance limits will not be able to maintain higher altitudes with a failed engine. In this situation, the aircraft is permitted to conduct a 'drift down' descent. Conversely, if an engine fails below lowest safe altitude, the aircraft must have OEI performance to climb to the lowest safe altitude or a point 500 feet above terrain in the area of operations using a net 1% gradient. The aircraft operator is required to limit the payload so that terrain clearance can be assured in the event of engine failure.

The company must be prepared to accept that not all passenger seats can be utilized to achieve the full One Engine Inoperative (OEI) accountability that Control 10.2 requires. This is particularly true when operating multi-engine helicopters at high temperatures and high density altitudes as found throughout the resource sector.

The aircraft operator must ensure that it provides companies with any payload restrictions that are required to enable continuation of flight with One Engine Inoperative (OEI) and sustain a 1% net climb gradient to the lowest safe altitude or a point 500 feet above the terrain in the area of operations:

- When operating over hostile environments; and/or
- At night or in instrument (non-visual) conditions; or
- When operating extended overwater flights.

10.3: Supply of Spares

Approved maintenance organizations must have a list of approved suppliers that are included in a Quality Assurance Program to ensure that parts received conform to FAA-approved (or equivalent) design data and are in a condition for safe operation.

MNT 1.03.05
MNT 2.03.01
MNT 2.03.03
MNT 2.03.04
MNT 2.03.05
MNT 2.03.06
MNT 2.03.07
MNT 2.03.08
MNT 2.03.09
MNT 2.03.10

For an aircraft to maintain the standard set by the initial certification, a critical control is to ensure that all spare parts used in the continued airworthiness of the aircraft are traceable, approved and manufactured to the same standard as those components originally fitted to the aircraft.

Aircraft spare parts must be genuine, procured from an approved supplier, traceable to the original manufacturer and stored in an enclosed area free of dust, moisture or any other agent that may compromise integrity and serviceability. Items in the stores area must be listed on an inventory and must be fully tagged with any expiry dates clearly noted.

There must be clear segregation of aircraft serviceable and non-serviceable parts.

Approved maintenance organizations must have quality assurance procedures to ensure that all parts and components to be used in aircraft maintenance are purchased through a recognized source and are accompanied by supporting documentation or engineering substantiation.

The aircraft operator must have a quality assurance process that verifies that the approved maintenance organization is providing an appropriate level of quality and reliability. This will require the maintenance organization to be included in the aircraft operator's audit schedule, unless an equivalent process is in place to guarantee the level of service provided (such as third party audit or applicable industry body certification).

Possible forms of oversight are presented below as examples of the methods available:

- Appointment of a Director Maintenance/Responsible Person: Oversees maintenance activities of the AMO on behalf of the AOC holder to ensure maintenance is conducted in accordance with the AOC Maintenance Control Manual or equivalent;
- Second party audit: The aircraft operator undertakes an audit of the service providers before or during the contract time using audit checklists to examine the contractor against defined criteria or standards;
- Third party audit: The aircraft operator engages a third-party to carry out an independent audit of the contractor using audit checklists to examine the contractor against defined criteria or standards;
- Survey: The approved maintenance organization completes a survey before or during the contract period to provide information on their internal methods of delivering a satisfactory product or service to the aircraft operator; and
- Self-audit: The approved maintenance organization conducts a self-audit (scope of which is agreed with the aircraft operator) before or during the contract period to examine the method of delivering satisfactory service to the operator.

This level of oversight is applicable regardless of whether the maintenance is provided in-house or contracted to a third-party maintenance organization. It is the responsibility of the aircraft operator to provide the necessary assurance that the maintenance provider is completing all tasks to satisfy both the regulatory airworthiness requirements and the operator's quality and safety requirements. The aircraft operator must clearly define, document and demonstrate how this interface is being managed.

evidence

The aircraft operator or its approved maintenance organization(s) must have a documented quality assurance surveillance program that verifies that approved parts suppliers hold current FAA-approval(s) (or equivalent) of their design data, meet industry quality and safety standards and are stored appropriately.

Details of the surveillance program must be published and records of surveillance activity must be available for review.

The aircraft operator or its approved maintenance organization(s) must have a process for tracking all parts held in its stores facility to verify their source and serviceability status.

10.4: Hangar Facilities

MNT 1.03.02
MNT 1.03.06
MNT 1.03.08

Hangar facilities that are suitable for the activities being performed must be accessible for aircraft operating on all long-term contracts. Long-term field operations, particularly in high rainfall, arctic or desert environments, must have sheltered arrangements for scheduled and non-scheduled field aircraft servicing.

Permanent hangars must be fitted with fire extinguishers and fire alarms which are regularly tested in accordance with fire regulations. Records of such tests must be made available upon request.

The aircraft operator in consultation with the company must ensure that aircraft fixed base locations have access to suitable hangars. Protection of the aircraft or helicopter from the elements will substantially increase the life of certain components and will allow maintenance personnel to focus their attention on maintenance tasks without being distracted by poor weather, fading light, strong winds, high rainfall, snow, etc.

Approvals granted to aircraft maintenance organizations will commonly reflect the locations at which maintenance activities can be undertaken and where compliance to the regulatory standards set by the responsible regulatory authority has been demonstrated.

Consider the provision of suitable facilities for the conduct of foreseeable maintenance activities at locations that are subject to long-term (greater than six months) or frequent use. Where permanent facilities are in use, they should be equipped with fire alarms, fire extinguishers, lighting, ventilation systems, eyewash facilities, appropriate spare parts storage, flammable stores and have a form of tool control and calibration register.

For all helicopter operations, consider the provision of overhead lifting equipment that can handle transmission and engine change requirements if necessary.

For all other locations, procedures must be in place to assess the suitability of facilities and address the facility needs for undertaking any non-scheduled maintenance activities that may arise.

Companies should engage with aircraft operators pre-mobilization to discuss provision of suitable hangars supporting their contracted activities. This becomes particularly important in long-term field environment where portable hangars can be easily mobilized to provide adequate control effectiveness.

evidence

Certificates of approval issued to approved maintenance organizations should document the locations at which specified maintenance activities can be routinely undertaken.

The aircraft operator or its appointed maintenance organization(s) should have documented procedures that address the suitability of facilities at any location at which non-scheduled maintenance activities may need to be performed.

Facilities should be regularly inspected to ensure that all required equipment is in installed and serviceable.

10.5: Helicopter Vibration Monitoring

MNT 2.08.03

Helicopters on long-term contract must have a plan endorsed by a Competent Aviation Specialist to fit a Health Usage Monitoring System (HUMS) or airframe and engine Vibration Monitoring System (VMS), where systems have been developed and approved for the helicopter type. The aircraft operator must follow procedures to routinely download and analyze data.

HUMS and VMS are used as post-flight diagnostic tools, where the data is collected and recorded from sensors and accelerometers for routine analysis. This analysis is aimed at providing early detection of potential component failure – particularly within the helicopter transmission.

Where an aircraft operator has either HUMS or VMS in use, the System of Maintenance should address procedures for routine data download and analysis of the data.

Personnel training and HUMS Go/No-Go criteria should also be addressed by the aircraft operator.

10.6: Engine Trend Monitoring

FLT 1.13.18
MNT 2.08.01
MNT 2.08.02

All single-engine turbine aircraft on long-term contract must fit an automatic electronic engine trend monitoring system when available for the aircraft type. The aircraft operator must follow procedures to routinely download and analyze engine trend data.

Engine Condition Trend Monitoring (ECTM) provides early detection of poor engine performance through trend analysis. Early intervention to any powerplant issues and subsequent rectification is a critical control to prevent engine failure. This is particularly relevant when associated with passenger carrying operations in single-engine aircraft.

The ability of ECTM to provide meaningful information relies on consistent and reliable data. This is best achieved through use of automatic data acquisition systems.

When ECTM is used, the aircraft operator should document the system that ensures engine condition trend monitoring is effectively carried out through:

- Articulating relevant personnel training and qualification requirements;
- Stipulating ECTM data is accessed at specified intervals;
- Stipulating ECTM data is only interpreted by an appropriately trained person;
- Ensuring all ECTM procedures meet OEM and regulatory requirements; and
- Outlining actions to be taken in response to detection of adverse trend data.

Associated records such as trend data print-outs/graphs and staff training records must confirm that requirements of the ECTM program are being appropriately carried out.

10.7: Minimum Equipment List (MEL)

FLT 1.01.04
FLT 1.02.12
FLT 2.03.13
MNT 1.04.08
MNT 2.05.02
MNT 2.06.01
MNT 2.06.02

Aircraft operators must develop a MEL for all aircraft on long-term contracts. All equipment installed on an aircraft must be operational, unless it is operated in accordance with an approved MEL or approved by the appropriate civil aviation authority under an established program for deferred defects.

Most aircraft are designed and certified with an amount of redundancy in their systems such that the minimum required airworthiness standards are exceeded by a substantial margin. Not all instruments, systems and equipment on-board an aircraft are required for safe operation of the aircraft all of the time. For example, instrument lighting is not required for operations in day visual conditions and heating systems may be inoperable in hot environments.

The MEL is a document which provides a regulatory approved framework allowing the aircraft operator's personnel to determine what items of equipment under what conditions are allowed to be inoperative at the time of dispatch for the intended flight. An approved MEL consists of an approved list of the specific inoperative equipment for a particular make and model of aircraft by serial and registration mark.

The MEL will define any operational or maintenance procedures and/or limitations that may be required to be applied prior to dispatch and/or during subsequent flight to maintain safe operations. The key to using the MEL is to understand that varying time limits exists for how long an aircraft may be operated between the deferral of an inoperative item and its repair. The aircraft operator should always ensure that the continued operation of an aircraft with inoperative equipment is minimized.

It is essential that training in the applicability and use of the MEL and associated documentation should be provided to both the aircraft operator's flight crew and the maintenance personnel.

evidence

Where required, the aircraft operator must have approved MELs for the relevant aircraft. The aircraft operator's MEL should be consistent with the Master MEL and approved by the responsible regulatory authority.

The Operations and Maintenance Control Manuals should detail MEL training requirements for all flight crew and technical personnel who have the operational expectation to utilize an MEL. Training records should be available as supporting evidence.

10.8: Aural Cabin Pressure Warning System

MNT 3.01.04

Where approved for the aircraft type and permitted by the National Aviation Authority, all pressurized aircraft must be equipped with an aural cabin pressure warning system in addition to any visual cabin pressure warning system.

One of the common findings from a number of incidents where a depressurization event occurred in the cabin of a pressurized aircraft is that the flight crew were unaware of the onset of the event, particularly in cases where a slow ascent of the cabin altitude occurred. While most States require the fitment of a cabin altitude alerting system in their aircraft certification standards, often in smaller pressurized aircraft, this warning system is restricted to a visual indication only. With a reduction in peripheral vision being one of the first physiological responses to a hypoxia event, the operation of a purely visual alerting system means that flight crew may not necessarily notice the alert at all. The addition of an aural alerting system to operate in tandem with the visual alerting system provides an additional layer of defence and an increased probability of a depressurization event being detected.

10.9: Critical Maintenance Tasks (CMTs) and Independent Inspections

MNT 2.04.03

Maintenance tasks that involve assembly or disturbance of any system that may affect the flight path, attitude or propulsive force, which, if errors occurred, could result in a failure, malfunction, or defect that would endanger the safe operation of the aircraft must be considered as a CMT.

CMTs must be clearly identified in maintenance worksheets or job cards.

CMTs must be subject to an Independent Inspection in accordance with established procedures, carried out by at least two persons, at least one of which is qualified and authorized to sign the Maintenance Release.

The aircraft operator should ensure that all CMTs that meet the definition above, as a minimum, are defined as such. Any item identified by the Type Certificate Holder or the responsible regulatory authority as a CMT (or an equivalent) should also be treated as such.

An Independent Inspection (also sometimes referred to as a Required Independent Inspection or Duplicate Inspection) should be conducted on all CMTs. The first of the two-person complement to inspect the task shall be the person who is to sign the Maintenance Release and may have been involved in execution of the task. The second person is the independent checker (verification) and should not have been involved in the task. Ideally they should also be qualified to sign the release but a person otherwise qualified to do Independent Inspections may be used.

Independent inspections should be recorded.

The Maintenance Procedures Manual of the Approved Maintenance Organization should detail the requirement and procedures for identifying and carrying out Independent Inspections following Critical Maintenance Tasks.

Work packs will provide evidence of identification of Critical Maintenance Tasks and evidence of Independent Inspection.

11.0: Weather

Weather conditions force an aircraft to deviate from its original flight path causing an accident

Weather is a key consideration in the planning and execution of all flight operations. Every weather assessment made by flight crew must be protected from external pressures intended on influencing their decision to commence or continue a flight (this includes the client). The resource sector has experienced many fatal accidents associated with aircraft continuing into deteriorating weather conditions for the category of flight undertaken. Independent weather assessment and decision-making is an area that only flight crew can make in the safe continuation of flight.

The supporting framework to resource sector aviation operations must include ensuring flight crew have access to appropriate weather information for pre-flight planning, en route and destination planning purposes. In the first instance it will be the aircraft operator's responsibility to provide access to this information. However in some remote areas, the company may need to make internet and satellite telephone capabilities available to crew members so that they can obtain the necessary information.

Weather analysis, interpretation and decision-making is an important skill-set for any crew. The aircraft operator must provide all training, tools and procedures necessary for the crew to perform their duties within the safe operating parameters of the aircraft and their own abilities.

11.1: Adverse Weather Policy

An Adverse Weather Policy must be developed by the company in conjunction with the aircraft operator when weather conditions exist that are suitable for flying, but not suitable for normal operations. Situations can include: excessive wind over helidecks prohibiting personnel movement to and from the helicopter, excessive sea state preventing an effective offshore search and rescue capability, or man-made smoke haze degrading visual conditions in a jungle environment. The Adverse Weather Policy must outline clearly under what conditions flying operations should be restricted or temporarily halted.

The purpose of an Adverse Weather Policy is to formalize an agreement between the aircraft operator and the company as to when weather conditions are such that aircraft operations are stopped, or are continued albeit with an increased level of approval authority.

Typically this policy is only required when the deteriorating weather conditions can have an impact on non-aviation safety issues. Examples include:

- Excessively high wind speeds for personnel movement on helidecks;
- Sea-state conditions that would prevent any search and rescue; and
- Excessive temperature extremes for arriving or departing passengers.

Normally put in place for offshore operations, an Adverse Weather Policy can have an impact for onshore desert and arctic operations. In all cases the policy should provide clear guidance on the conditions jointly agreed between the aircraft operator and the company under which flying operations must be restricted or temporarily halted.

The requirement for an Adverse Weather Policy will be identified during the pre-mobilization start-up operational risk assessment involving the aircraft operator and company representatives.

FLT 1.10.01

11.2: Thunderstorm Avoidance

Aircraft operators must outline thunderstorm avoidance techniques in the Operations Manual.

Thunderstorms have the ability to impact on all aviation operations, both fixed and rotary wing aircraft, and the threat must be understood by all flight crew.

The aircraft operator must document all techniques relevant to the aircraft type operated that are related to navigating around thunderstorms and avoiding the worst of the conditions that are associated with these systems.

Information will include:

- Avoidance techniques applicable to operations with or without serviceable weather radar equipment;
- Most likely location of severe turbulence around the thunderstorm and the separation standards to be applied to avoid this;
- Precautions to be taken when overflying small but building storms;
- The minimum height at which to fly over a mature storm when clear of cloud; and
- The minimum lateral separation to be applied when avoiding upwind and downwind sides of storm cells both above and below the freezing level.

evidence

The aircraft operator must ensure that information contained in the Operations Manual provides crews with adequate guidance on the techniques to use to avoid severe weather associated with thunderstorms.

11.3: Weather Radar

FLT 1.10.2

All aircraft contracted to be able to operate under IFR or at night must be fitted with a serviceable weather radar. If the weather radar becomes unserviceable, the aircraft must not be flown in Instrument Meteorological Conditions (IMC), or at night unless the weather forecasts indicate there is no likelihood of thunderstorms, lightning, turbulence or icing.

Weather radars fitted to aircraft are designed for the active detection of adverse weather conditions and allow flight crew to determine appropriate course changes to avoid the adverse weather.

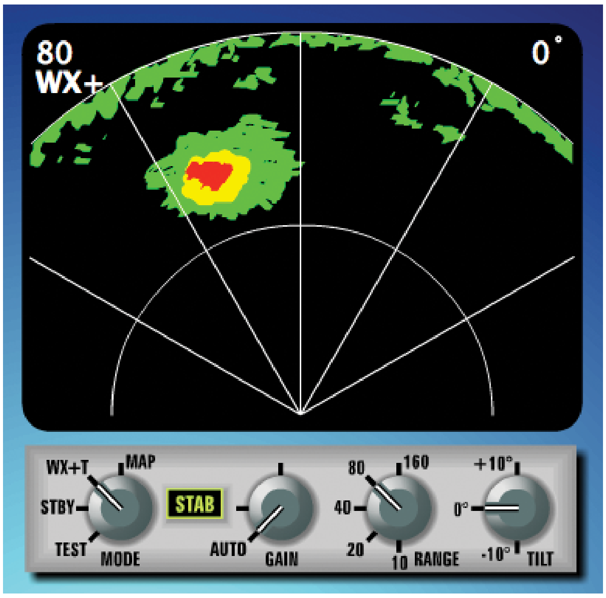
Despite airborne weather radars being fitted to aircraft, incursions into very active cells still occur. It is important that aircraft operators provide adequate training to cover weather radar capabilities, limitations, operating procedures and interpretation to ensure the crew understands the system.

evidence

The aircraft operator must provide SOPs, consistent with the information provided in the aircraft and/or radar manufacturer's AFM/POH, that specify procedures for use and management of the weather radar.

The provisions relevant to weather radar systems in the aircraft operator's MEL or OM should specify a requirement for the system to be serviceable for night or IFR flights, unless operations can be conducted on routes where weather forecasts indicate there is no likelihood of significant convective cloud thunderstorms, lightning, turbulence or icing.

Syllabuses for training relating to weather radar capabilities, limitations, operating procedures and interpretation should be published. Training records must confirm that training requirements have been applied in the training of staff.



11.4: Wind Shear Training

FLT 2.03.15

Flight crew operating aeroplanes on long-term contract must have ongoing training addressing the identification and recovery measures associated with microburst and wind shear phenomenon.

The aircraft operator should have in place information, guidance and procedures regarding the recognition, avoidance and recovery from wind shear and microburst conditions. Specific training and checking requirements should also be developed and implemented to ensure flight crew develop and maintain the:

- Knowledge needed to identify the actual or potential presence of wind shear; and
- Competencies required to successfully perform wind shear escape procedures when wind shear is being encountered.

The documented procedures must, where required, expand on and be consistent with information and procedures provided by the aircraft manufacturer regarding recovery from wind shear encounter that may be contained in the aircraft approved flight manual or pilot operating handbook.

Where available, check and training of flight crew on wind shear recovery procedures should be conducted in an approved flight simulator using wind shear profiles recorded during actual wind shear encounters.

FSF ALAR Briefing Note 5.4 – Wind Shear *(http://flightsafety.org/files/alar_bn5-4-windshear.pdf)*

evidence

The aircraft operator must document a clear policy regarding the recognition, avoidance and recovery from wind shear and microburst conditions. Documented procedures must be consistent with information and procedures provided by the aircraft manufacturer in the aircraft approved AFM or POH.

Pilot training records should confirm that requirements of the training program applicable to wind shear identification and recovery have been appropriately applied in the initial and recurrent training of pilots and the ongoing evaluation of pilot competency.

Aircraft operators are encouraged to develop and implement a policy for mandatory, internal reporting of occurrences involving approach destabilization and the associated go-around as would be experienced with wind shear encounters. Tracking of such reports by the aircraft operator's SMS will assist with the identification of specific risks that may exist.

11.5: VFR Minimum Requirements

FLT 1.03.05

Aircraft operating under VFR must be flown in accordance with the minimum local regulatory requirements for flight under the VFR for departure, en route and destination legs. Local Standard Operating Procedures must be developed for areas such as mountainous jungle operations, where rapidly changing VFR conditions can be common.

Each aircraft operator should establish weather minimums, which will meet or exceed the minimums prescribed by the responsible regulatory authority for VFR flight.

If the local conditions are dynamic and constantly changing, there may be a requirement for a conservative approach of increasing the weather minimums depending on the experience and skill level of the flight crew. Examples of these areas are the high density-altitude mountainous jungle environments as experienced in PNG, South American Andes operations, parts of South East Asia and Africa.

As an alternative or in addition to publishing defined weather minimums, an aircraft operator may elect to adopt a process based on a risk assessment methodology as promoted in some ADM programs.

(http://www.faa.gov/training_testing/training/fits/guidance/media/Pers%20Wx%20Risk%20Assessment%20Guide-V1.0.pdf)

During the start-up operational risk assessment prior to supporting resource sector activities, the aircraft operator must review the VFR weather minimum criteria for the area of operations.

evidence

The aircraft operator must document a clear policy regarding the minimum weather conditions that apply to a VFR flight, particularly where local conditions are dynamic and constantly changing due to local topography or other conditions.

11.6: Cold Weather Training

FLT 2.03.16

Crew who operate aircraft in a cold weather environment (ground snow and ice) must undergo annual training prior to the onset of the winter season that addresses:

- ***Pre-takeoff inspections;***
- ***Anti-icing and de-icing including use of holdover time tables;***
- ***In-flight icing and associated hazards;***
- ***Cold weather operational takeoff, approach and landing; and***
- ***Runway visibility, contamination and performance considerations.***

Free online courses addressing the above include NASA aircraft on-line icing courses *(http://aircrafticing.grc.nasa.gov/).*

The hazards associated with frost, snow, ice and freezing rain must be understood by all flight crew and be constantly assessed throughout the flight. Always seek icing advice from the Aircraft Manufacturer.

Where aircraft are operated in a cold weather environment, the aircraft operator must have in place procedures that address ground and flight icing conditions. Initial and annual refresher training for all flight crew and relevant ground handling and engineering staff addressing cold weather operations is required for those areas impacted by these hazards.

Winter operations training packages should be periodically reviewed by aircraft operators to incorporate the latest relevant information associated with the threats and hazards associated with cold weather operations.

Training programs for cold weather operations, including review of recent industry incidents associated with icing, are typically scheduled for all relevant personnel prior to the onset of the winter season.

evidence

Policies and procedures for de-icing and anti-icing of aircraft on the ground and other activities associated with cold weather operations should be published in the Operations Manual where applicable. The syllabus for initial training and processes for conducting periodic training and ongoing evaluation of relevant staff should also be documented.

Associated training records should confirm that these training requirements have been applied in the induction training of new staff and are repeated annually prior to the onset of winter in the area of operation.

12.0: Medical Evacuation

In addition to the Controls and Defences detailed in this Standard, the following requirements apply to Medical Evacuation (Medevac) flights

A medical evacuation by air (medevac) is the emergency evacuation of a sick or injured person to a location where suitable medical facilities and care are available. In the resource sector this typically occurs from mine sites, offshore facilities, exploration camps and remote areas to pre-determined locations.

The medical condition of a patient and the level of en route care that may be administered by medical personnel could have a bearing on the capability of aircraft type to be used. Use of specifically equipped aircraft may be required when requiring life-support systems, oxygen, defibrillators and multiple stretcher configurations.

Resource sector personnel involved in the medevac call-out and approval process need to remain aware that the decisions by flight crew involving safe flight operations must remain independent to the medical urgency of the evacuation underway.

Medical evacuation (medevac) occasionally requires the use of aircraft within a timescale where achieving prior approval of an aircraft operator may not be in the best interests of the affected personnel. However, there is a balance to be struck between responding to an emergency and the additional risks of using sub-standard aircraft operators which might put the aircraft (and all passengers) at risk.

In an emergency, all reasonable effort must be made to obtain input from the designated aviation specialist prior to management decision in using a non-compliant aircraft operator. The associated risk assessment must consider comparative risks to personnel health or safety from using a non-compliant aircraft operator or delaying the process until an approved operator can be on-scene.

12.1: Securing of Medical Equipment

The aircraft operator must have a procedure that outlines the methodology associated with securing medical equipment in aircraft. FLT 4.01.01

The aircraft operator must ensure that any medical equipment loaded onto an aircraft is appropriately fitted and secured for all phases of flight including takeoff and landing. This should include secure storage locations within the cabin of the aircraft to enable medical stores to be accessible in-flight. Equipment such as oxygen bottles, stretchers and associated life support systems if carried must have a load plan addressing correct fitment and securing methods.

The medical team/organization must have procedures to provide the operator/flight crew details of any non-standard medical equipment to be carried. Medical teams must ensure all mobile medical equipment have appropriate power supplies in case the batteries have limited duration. Power supplies must be certified for aviation use.

evidence

The aircraft operator must provide documented procedures to be followed during medevac flights that will ensure all equipment is adequately fitted and secured during flight. Where the aircraft operator provides specific storage locations and/or equipment, the Operations Manual must provide instructions to ensure correct usage.

12.2: Weight and Balance

FLT 4.01.02

The aircraft operator must ensure that the weight and balance calculations accurately account for stretcher carrying operations.

In addition to clear loading instructions regarding the correct fitment and restraint of stretchers within the aircraft discussed in 11.1, the aircraft operator must have load information available for flight crew to accurately complete weight and balance calculations in the medevac configuration.

The medical team/organization must consider the weight and portability of the medical equipment required for the medevac. Non-essential equipment adds weight and may ultimately limit payload or range. The combined weight of patient, medical team and portable medical equipment must be provided to the operator/crew as early as possible for consideration during weight and balance and flight planning calculations. Any limitations must be communicated early to avoid delays or replanning complications.

evidence

The aircraft operator's Operations Manual must contain procedures to be used to determine the aircraft weight and balance for each medevac flight where stretchers and ancillary equipment are carried.

12.3: Medical Transfers

FLT 4.01.04

The aircraft operator must have a procedure for operating aircraft at Sea Level cabin pressure for medical transfers, when required.

Certain medical conditions will require that the patient is maintained at, or as near as possible to, a sea level atmospheric pressure. Accordingly, aircraft used for the medical transfer of patients who are subject to these conditions should be equipped with a passenger cabin that can be adequately pressurized and maintain a sea level cabin environment throughout the flight.

For aircraft such as helicopters that do not have a pressurized cabin, operation at low altitudes may be the only option to deal with the medical emergency being experienced.

Flights planned to operate at lower than normal cruise levels to facilitate sea level cabin pressure must actively consider minimum safe altitudes and weather for the route planning.

The flight crew must discuss with the medical team the minimum cabin pressure achievable and any operating limitations for potential negative impact on the patient.

Whether the aircraft involved in transfer are pressurized or not, procedures and advice must be available to flight crew to support them in managing the issues and considerations that can arise during transfer at sea level pressure.

evidence

The aircraft operator's Operations Manual must contain documented policies and procedures regarding medevac operations where the patient's medical condition requires the pressure of the aircraft cabin to be maintained at that equivalent to sea level.

12.4: Communications

The aircraft operator must have the capability (such as headsets) to allow communications between the medical team and the pilots for each aircraft type considered. FLT 4.01.03

Medevac operations can involve periods of high workload for both the flight crew operating the flight and the medical personnel providing the in-flight care of a patient. This can be particularly common where the medical transfer of a critical care patient is being conducted in adverse weather conditions. In these situations it can be vital for both the safety of the flight and the patient being transferred, that all personnel can engage in immediate and unrestricted communication. To facilitate this, aircraft used in medevac operations should be equipped with an effective intercommunication system between the medical team and flight crew.

Flight crews must carry out a pre-flight briefing with the medical crew. During this briefing the following items are to be discussed and actioned/resolved in addition to the normal passenger briefing:

- Any special requests/requirements for the mission specified by the medical crew;
- The loading and unloading methodology of the patient;
- The intended use of the stretcher system and mobile medical equipment;
- Management of inflight emergencies;
- Seatbelt use – Medical staff to advise crew if seatbelts need to be unfastened in-flight; and
- Seating configuration – identify most suitable seating of medical crew for patient access.

The aircraft operator's Operations Manual must outline provision and use of aircraft intercommunication systems for the medical team and flight crew. The Operations Manual should also provide guidance on when 'sterile cockpit' procedures should be applied.

12.5: Risk Assessment

The aircraft operator must have a risk assessment process so that the urgency of medical evacuation is separated from the safety-of-flight decision-making process. ORG 3.04.07

The assessment of risks for medevac flights is a complex process given the competing priorities: safe conduct of the flight versus expedient retrieval involving a potentially life threatening situation. The safe conduct of the flight must always take priority.

A review of industry fatal accidents in the medical evacuation role presents numerous accidents that resulted from the conduct or continuation of flight operations past safe operating parameters due to a fixation on patient well-being. When resulting in fatalities, the incidents often involved the loss of more than just the patient being retrieved.

A fundamental foundation to a safe and successful medevac activity (as opposed to patient outcome), is having a risk assessment process that enables flight go or no-go decisions to be made independent of the ensuing medical emergency. The company should recognize and support this process.

Contracting companies/medical organizations should consider regular drills involving the aircraft operator and medical teams to ensure all parties are well trained and confident to undertake medical evacuation flights, especially relating to emergency procedures for stretcher patients during an emergency situation.

evidence

The aircraft operator must document a policy regarding the risk assessment process that applies to decisions that have a bearing on the overall safety of a flight operation. Such policies and procedures are to address the initial decision to undertake a flight and the in-flight decision processes that determine whether a flight is continued as planned or diverted.

Aircraft operator records should confirm that the documented policies, processes and procedures associated with the Operator's Safety Management System are being complied with and that the required risk assessments have been completed.

12.6: Equipment Documentation

MNT 5.01.01

The aircraft operator must have appropriate documentation, such as Supplemental Type Certificates (STC), for all medical equipment attached to the aircraft.

All aircraft modifications that provide for attachment of medical equipment to the aircraft must be carried out in accordance with all applicable airworthiness requirements of the responsible regulatory authority.

evidence

All aircraft modifications that provide for attachment of medical equipment to the aircraft are to be appropriately documented with drawings, data and specifications and be subject to a Supplemental Type Certificate (STC) or equivalent.

The Operations Manual must contain descriptions of the equipment fitted and the manner in which modifications to fit medical equipment may affect the normal and emergency operation of the aircraft and its systems. The equipment should be installed in the aircraft as per the specifications.

12.7: Equipment Inspection Schedule

MNT 5.01.02

All medical equipment (including oxygen cylinders) that are capable of being attached to the aircraft must be on an inspection schedule to determine serviceability.

The aircraft operator's System of Maintenance for an aircraft used in medevac operations must include details of the inspection schedule applicable for all medical equipment fitted to the aircraft and held by the operator to ensure its ongoing serviceability. The inspection schedule should reflect any requirements or recommendations of the equipment manufacturer or any conditions that may be applicable to the STC (or equivalent) that address fitment of equipment to the aircraft.

evidence

The aircraft operator's System of Maintenance (or equivalent) for an aircraft that is used in medevac operations includes details of the inspection schedule that applies to all medical equipment fitted to the aircraft to ensure its ongoing serviceability.

Aircraft maintenance records must confirm that documented requirements and procedures contained in the aircraft System of Maintenance (or equivalent) are being followed.

12.8: Provision of Oxygen

MNT 5.01.03
MNT 5.01.04

The aircraft operator must have a procedure that ensures any oxygen cylinders are filled to manufacturer specifications. Where oxygen cylinders are permanently fitted to stretcher systems they must undergo regular hydrostatic testing in accordance with manufacturer specifications.

A necessary component of any aircraft used for the conduct of medevac flights is the provision of oxygen for patient use during flight. The provision of oxygen for medical use should be independent of that required to be carried for operational purposes.

Oxygen cylinder quantities are to be checked and replenished as necessary post flight. Oxygen supplier details to be kept on record, with phone numbers to be kept available for out of hours requests.

evidence

Where aircraft to be used in medevac operations are permanently fitted with a medical oxygen supply source the Operator's Operations Manual must contain descriptions of the equipment fitted and procedures that ensure oxygen cylinders are filled to and in accordance with manufacturer specifications. Oxygen cylinder quantities should be subject to post flight inspection.

Where portable oxygen equipment is to be used, the aircraft operator's procedures should contain requirements to ensure that oxygen cylinders are filled to manufacturer specifications and are safe for carriage on the aircraft.

The oxygen equipment must be fitted to the aircraft as per the manufacturer's data or the applicable engineering approval.

12.9: Flight Crew Qualifications, Experience and Recency

FLT 2.01.01

Comply with the requirements listed in Appendix 1 of the BAR Standard.

The aircraft operator must ensure that all flight crew assigned to medevac flights have a current licence and meet both the minimum qualification and experience requirements defined by the responsible regulatory authority and as specified in Appendix 1 of the BAR Standard.

evidence

The aircraft operator must maintain records of flight crew qualifications and experience. There must be a documented control mechanism in place to ensure that when crew are assigned to flights, crew pairings meet the task requirements.

Flight crew files and rostering records must confirm that minimum experience requirements are being met and crew allocations are appropriate to meet the task requirements.

12.10: Cleaning of Aircraft Post Evacuation Mission

FLT 4.01.05

Post mission, the aircraft must be cleaned thoroughly, and if this happens at night time, the task must not be commenced until sufficient lighting in the cabin has been arranged.

Cleaning crews must be briefed on the hazards posed by leftover medical waste.

The charter company is responsible for general cleaning of the interior of the aircraft cabin including all hard surfaces, soft coverings, floor and toilet areas. The medical flight crew is responsible for wiping down any medical equipment and areas of possible crew/ patient contact contamination. This should be performed after each flight mission with an appropriate disinfectant.

Small spillage of blood or body fluids (inclusive of sputum, vomitus, faeces, urine and liquids) in the aircraft cabin during a flight mission, are to be cleaned with disinfectant wipes and cleaning agent. Medium to large spills of blood or body fluids needs to be decontaminated with absorbent spill bags. On arrival to the destination location, affected areas need to be re-assessed for additional cleaning.

Medical flight crew should inform the flight crew of any spill incident on arrival. In the case of a blood spill beyond the mattress and floor, this requires immediate escalation followed by a cabin inspection and cleaning should be done with a soapy non-corrosive agent.

All medical waste should be contained and secured in approved bio-hazardous containers. All uncapped needles and sharp items should be placed directly into a sharps container and the lip needs to be clipped closed. All used linen should be placed in a clear bag unless soiled with blood or body fluids, in which case a yellow bio-hazardous bag is to be used. On completion of a mission, it is the responsibility of the medical flight crew to check the interior of the cabin prior to disembarkation for any loose sharps or medical waste and return these for proper handling/disposal.

Best practice requires ongoing evaluation of cleaning procedures by regularly performing surface swabs from patient care areas within the cabin, stock equipment and medical environs by the medical flight crew. This will assess the effectiveness of the cleaning procedure.

Any medical waste found after the medical crew have departed, needs to be documented and reported back to the medical provider.

Health authorities need to be informed for any patient transported with a highly infectious notifiable disease such that compliance with regulations regarding the methodology of aircraft disinfection can be undertaken. In some instances this may necessitate quarantine of the aircraft and possibly the crew. In such instances, the aircraft should be rendered non-operational until clearance from the relevant health authorities has been granted.

evidence

The operator should have procedures for cleaning of the aircraft or have a service level agreement in place with a contract cleaning company which match the requirements of the control. The Operator should also have a procedure for dealing with discovered medical waste contamination including reporting through the operator’s hazard reporting system. Appropriate cleaning equipment, PPE, and lighting should be available to cleaning crew.

12.11: Arrival at Destination [Destination Arrival or Transit Planning]

Medevac planning must consider and coordinate with the operator, the destination arrival or intermediate transit procedures to include ground ambulance arrangements, bed-to-bed or tarmac access considerations. FLT 4.01.06

The destination arrival procedures must be carefully planned and coordinated with the aircraft operator, ground handler, any ground transport and medical flight crew, prior to the mission departing. These arrangements are subject to risk assessments and operating checklists to ensure timely movement of the patient with no disruption or delay.

Ambulance Crews accepting patients from aircraft must have unfettered airside access or other temporally and practically equivalent access, at any time of day or night. The planning and management of airside access may be more difficult at regional or remote airports outside of normal hours of operation. Points of ingress and egress along with access points from the ground side if airside access is unavailable should be identified in advance.

evidence

The operator should have destination arrival procedures and an arrival checklist. Operational Risk assessments should include arrival at destination for medevac flights. The operator should also have a landing site register of patient transfer sites with contact details of safety and security personnel.

Courtesy: Cobham

13.0: Aircraft Accident

Mitigating defences in the event of an aircraft accident

All aviation operations must be conducted in a manner that manages and mitigates the known or identifiable risks involved to ensure that the residual risk is as low as reasonably practicable.

If a critical control failure results in an event occurring, the BAR Standard identifies defence controls to mitigate the impact of the incident.

The defences identified in this section are recognized as the minimum expectation and companies, through risk assessment conducted jointly with their contracted service providers, are encouraged to provide additional mitigation as warranted by localized conditions.

13.1: Aircraft Certification Standards

Aircraft designed to the latest certification standards have increased crashworthiness and survivability characteristics when compared to those aircraft certified to older standards. Consider the certification standard when selecting aircraft for all long-term contracts.

Over time, the emphasis on aircraft certification standards has increased. From being initially focused on the airworthiness aspects of the aircraft design such as structural strength and handling qualities, the overall crashworthiness of a design has been given greater importance and emphasis in certification requirements.

The certification approach to crashworthiness principally involves ensuring that:

- Aircraft occupants are provided protection from the crash impact;
- The possibility and severity of a potential post-impact fire is minimized; and
- Evacuation of occupants from the aircraft cabin can occur as quickly as possible.

Periodic upgrading of regulatory certification standards has led to developments that enhance the effectiveness of each of these factors.

Prior to any contract renewal or tender process, companies should consult with aviation specialists to determine the availability and practicality of contracting aircraft to the latest certification standards.

13.2: Emergency Response Plan

ORG 3.11.01
ORG 3.11.02
ORG 3.11.03
ORG 3.11.04
ORG 3.11.05
ORG 3.11.06
ORG 3.11.07
ORG 3.11.08
ORG 3.11.14

All aircraft operations (including company owned or operated airports) must have an Emergency Response Plan (ERP) commensurate with the activity undertaken that covers: documented land-before-last-light limitations, exposure considerations, local Search and Rescue (SAR) capabilities, and hazards associated with the surrounding environment.

The ERP must be exercised annually for all long-term operations and include a bridging document detailing lines of communications between the company and aircraft operator.

Aviation accidents/significant incidents are rare events and despite the importance of implementing immediate and positive action, evidence shows that very few organizations are prepared when such an event occurs. Initiation of timely and appropriate action is extremely critical in situations where delays or the implementation of incorrect actions may affect the chances of someone's survival.

People who have been involved in the immediate response to an aircraft accident will readily agree that during the first few minutes (and maybe hours) events can be confusing and chaotic. How an organization performs in the aftermath of an accident or other emergency can depend on how well it handles the immediate response during that time immediately following a major safety event.

Successful response to an emergency begins with effective planning. Both the company and aircraft operator should develop documented ERP detailing what should be done after an accident and who is responsible for completion of each action. The ERP provides the basis for adopting a systematic approach to managing the organization's affairs and operations following a significant and unplanned event and should be practiced and reviewed regularly.

evidence

The aircraft operator must document an ERP to provide instructions and guidance on the duties and obligations of personnel following an accident or significant incident.

The company must document an ERP for each airfield they operate. An airfield ERP must be appropriate to the aircraft operations and other activities conducted at that location and should provide for the coordination of actions to be taken in an emergency at the airfield or in its vicinity.

An ERP appropriate to the size, nature and complexity of the operations being undertaken should be documented and available.

The ERP should adequately detail and provide for:

- A responsible and qualified person to lead the emergency response;
- The duties and responsibilities of key personnel in an emergency;
- Contact details for all relevant organizations and individuals including local search and rescue (SAR) capabilities;
- Effective communication between the aircraft operator, company and SAR resources;
- A process for periodically checking and updating emergency contact lists; and
- Conducting periodic, scheduled emergency response drills, exercises and/or tests (if the aircraft operator conducts offshore operations, it should ensure emergency response drills include worst-case scenarios involving considerations such as last-light, significant weather and the time taken to search for missing aircraft).

The documented ERPs for both the company and aircraft operator should provide guidance to both organizations in pre-planning for emergencies, as well as detailing the protocols that will ensure appropriate coordination between the company and aircraft operator and other affected agencies.

13.3: Emergency Locator Transmitter

MNT 3.03.01
MNT 3.03.02

An Emergency Locator Transmitter (ELT) meeting the requirements of Technical Standard Order (TSO) 126 (406MHz) or equivalent must be fitted to all contracted aircraft. The responsible party noted on ELT registration as the primary contact must be detailed in the aircraft operator's Emergency Response Plan.

ELTs are distress beacons that are activated following an aircraft accident either automatically using a crash sensitive switch that detects excessive force of deceleration or manually by a pilot or other person.

Each ELT has a discrete digital code that, when activated, transmits a position and identification signal that is detected by satellites within the international Cospas-Sarsat system. This information is then transmitted back down to ground stations where the code is read, enabling the source of the transmission to be identified (aircraft registration and location) and the owner of the aircraft determined. ELT registrations are required to be updated to reflect the current operator and contact details. The aircraft operator's point of contact (normally a key member of the Emergency Response Team) should be registered with the applicable authority.

evidence

Documented procedures for the activation, serviceability testing and maintenance of ELTs should be provided in the Aircraft Flight Manual (AFM), Operator Manual (OM) and Maintenance Manual (MM) as required and applicable.

Each ELT should be registered with the appropriate authority and the details recorded in the ERP. The aircraft operator should maintain ELT registration documents that ensure the operator contact details and applicable aircraft identification are current and correct.

Aircraft maintenance records must detail the completion of serviceability testing and maintenance procedures of ELTs, and show that devices are being maintained in accordance with the approved System of Maintenance.

13.4: Satellite Flight Following

FLT 1.12.01
FLT 2.07.02

All aircraft on long-term contract operating in hostile environments must be fitted with satellite flight following systems. The system must be monitored by designated flight following personnel with no secondary duties who are able to initiate the Emergency Response Plan if required. The system components must include: a cockpit distress function with corresponding audio at the base station, cockpit indication of functionality, satellite telephone with text back-up, internet-based monitoring system and the ability to adjust reporting intervals based on altitude.

Satellite flight following equipment provides three dimensional coordinates of appropriately equipped aircraft to authorized ground stations via an associated satellite network. Aircraft GPS position information is transmitted to the satellite network and relayed to ground stations where this information is represented real-time on an internet-based graphical map showing the speed, altitude, direction and position of aircraft.

Satellite flight following significantly reduces the time required to locate an aircraft and respond to an emergency situation, in turn maximizing the chances of survival where aircraft operations are conducted in hostile environments.

evidence

Where an aircraft operator has aircraft fitted with a satellite flight following system, the operator should provide documented procedures that allow for the system to be monitored by designated flight following personnel, with no secondary duties, who if required, are authorized and able to initiate the Emergency Response Plan.

The Operator's Operations Manual (or equivalent document) should contain job descriptions that include the roles and responsibilities for these positions and the training requirements for persons appointed to these positions. It should also contain the process by which their ongoing competencies are assured. The documented training requirements should adequately address management of the flight following function in both normal and emergency operations. Where personnel associated with flight following are to utilize radio communications equipment that transmits over the aeronautical radio communication network, documented requirements must detail the training and licensing that applies.

13.5: Flight Following

Where flights are conducted outside of controlled airspace or are not subject to any form of position reporting, the aircraft operator in conjunction with the company must establish a system of flight following appropriate for the operation. An Emergency Response Plan must be able to be activated at all times in the event of distress or loss of communications.

FLT 1.12.02
FLT 2.07.01
FLT 2.07.02

Flight following is normally a service provided by national air traffic control services which focuses on providing information about passing and surrounding traffic. An added benefit of the services provided is the monitoring of an aircraft's normal operations and the ability to initiate response actions in emergencies.

In situations where flights are authorized to be conducted without flight following being provided by ATC, the aircraft operator must ensure that a system is in place for all such flights. The system must closely monitor the safety and progress of flights and initiate the ERP in the event of an emergency situation developing or communications being lost.

evidence

Where an aircraft operator conducts flights outside of controlled airspace or in locations where they are not subject to any form of position reporting, the operator should provide documented procedures that allow for such flights to be monitored by designated flight following personnel. Persons who are responsible for flight following will be tasked with no secondary duties and must be authorized, if required, to initiate the ERP and notify relevant SAR authorities.

The aircraft operator's OM (or equivalent document) should contain job descriptions that detail the roles and responsibilities for these positions along and the training requirements for persons appointed to these positions. It should also contain the process by which their ongoing competencies are assured. Where personnel associated with flight following are to utilize radio communications equipment that transmits over the aeronautical radio communication network, documented requirements must detail the training and licensing that applies.

More on next page...

The aircraft operator's documented SOPs provides for equipment requirements and procedures that will ensure that constant radio contact can be maintained and that routine position and altitude reporting occurs at intervals of 15 minutes, but not exceeding 30 minutes.

13.6: Survival Kit

FLT 1.09.06
MNT 3.03.03

Survival kits appropriate for the geographical location and climatic conditions (offshore, jungle, arctic, desert, etc.) must be carried for those operations where search and rescue response times would require use of the equipment.

The ability for a search and rescue response will vary, and will always be affected by variables such as weather, availability of resources and time of day. Because of this, every flight should be considered as a potential survival situation requiring survival equipment appropriate to the location and climate.

The aircraft operator will have a documented procedure specifying what requirements are to be contained in a survival kit if requested by the BMO or when required by the responsible regulatory authority. Where a survival kit is not routinely carried on an aircraft, the aircraft operator should have a documented procedure to be followed in circumstances where the fitment of survival kits is required. The condition and content of a survival kit should either form part of the System of Maintenance or be tracked and inspected using an equivalent process.

The content of the survival kit should be described in the aircraft operator's documentation and must be applicable to both the seating capacity of the aircraft to which it is fitted and the geographic and/or hostile environment where operations are to be undertaken.

13.7: Flight Crew PLB

FLT 5.04.03

Flight crew operating helicopters in hostile environments must have access to a voice-capable GPS Personal Locator Beacon (PLB) and carry any other necessary survival equipment on their person.

The requirement for helicopter flight crew to wear a voice-capable PLB as mitigation addresses several lessons-learned from resource sector accidents:

- Back-up source of location in the event the ELT does not activate;
- The ability to communicate to searching aircraft to assist in locating survivors. This is particularly important in a jungle environment where the overhead canopy may prevent the searching aircraft from visually identifying the survivors below; and
- The ability to communicate the condition of the survivors to the searching aircraft, and whether there is a requirement to winch the critically injured out prior to last light before a ground party can reach the accident scene.

The requirement to have the PLB carried in a survival vest on the flight crew is to maximize the opportunity of its use in any accident scenario. Where the aircraft operator elects to carry voice-capable PLBs in the cockpit, but not as part of a flight crew survival vest, a risk-based discussion demonstrating equivalent level of capability should be documented and available to the company.

Where an aircraft operator undertakes helicopter operations in hostile environments directions should be provided in the Operations Manual regarding the requirement for flight crew to carry a voice-capable, GPS PLB on their person.

Maintenance records should detail the completion of serviceability testing and maintenance procedures of beacons fitted to survival vests.

The aircraft operator should maintain registration documents for each beacon that appropriate identification and contact details are up to date and correct.

13.8: First-Aid Kit

At least one first-aid kit must be carried on all aircraft. MNT 3.03.04

The aircraft operator must ensure that a minimum of one first-aid kit is carried on all aircraft that are used to support resource sector operations. Where not defined by regulatory requirements, the contents of first-aid kit(s) should be determined by specialist medical advice and applicable for the type of activities being undertaken.

The first-aid kit(s) should be stored in an appropriate location in the aircraft to ensure ready access by the crew in-flight. The location should be near an exit as it may need to be used outside the aircraft in an emergency situation.

The aircraft operator's documented procedures must require a minimum of one first-aid kit to be carried as aircraft equipment on all aircraft that are used to support company operations. The aircraft operator should document a defined location where the first-aid kit(s) is retained on each aircraft and where the contents of a first-aid kit are not defined by regulatory requirements, a full description of the required contents of the kit carried on each aircraft.

The aircraft operator should have a documented procedure in place to provide for the contents of first-aid kit(s) to be routinely inspected and ensure the required contents remain intact, serviceable and within the expiry date.

Crew change – Western Australia

13.9: Passenger Dress Requirements

Passengers must wear clothing and footwear appropriate to the environment being flown over regardless of the flight duration.

With the exception of hard hats with chin straps, the wearing of caps and other headgear of any type in and around helicopters is prohibited. This does not apply to flight crew members inside the cockpit, conducting an aircraft inspection with rotors stopped or during rotors running with the cap secured by communication headset.

The ability to adjust the environmental conditions of a passenger cabin of an aircraft ensures that, despite the severity of ambient conditions outside the aircraft, passenger comfort can be maintained. While this level of comfort can enable passengers to wear clothing that is comfortable for the flight, what a passenger wears on a flight can significantly affect their chances of surviving an emergency where the aircraft may be required to make an emergency landing at a location other than the intended destination.

To maximize the chances of surviving an emergency landing, passengers must be required to wear clothing and footwear appropriate to the environment being flown over, based on a risk assessment. Transport Category aeroplanes are generally excluded from this requirement, however at the discretion of the company these aircraft may continue to be included in the requirement.

Guidance associated with helicopter and commuter category aircraft typically includes:

- Long sleeve shirts and long trousers;
- Closed-toe shoes with skid-resistant soles;
- Avoid any synthetics that melt when exposed to intense heat; and
- Use of layers in cold, hostile environments.

The company should develop guidance on passenger dress requirements, in consultation with the aircraft operator. The dress requirements established by the company should also be the minimum acceptable standard that applies to the aircraft operator's personnel.

13.10: Cockpit Voice Recorder (CVR)/Flight Data Recorder (FDR)

MNT 3.04.01

Aircraft on long-term contract and certificated with a seating capacity of more than nine passenger seats shall be fitted with a Cockpit Voice Recorder and Flight Data Recorder when available for the aircraft type.

A cockpit voice recorder (CVR) records the audio environment in the flight deck of an aircraft and a Flight Data Recorder (FDR) monitors and records specific aircraft performance parameters. While outputs from the FDR may be used to support a Flight Data Monitoring (FDM) – or Flight Data Analysis Program (FDAP) – the prime purpose of both the CVR and FDR is to collect and record data associated with the conduct of flights for the purpose of investigation of accidents and incidents. Typically, data is recorded onto a device designed to survive an accident and both devices are mounted in the tail section of an aircraft to maximize the likelihood of their survival in a crash.

Outputs from both the CVR and FDR are protected by regulations that ensure any data retrieved is for accident investigation purposes with the aim of improving safety.

evidence

Where fitted, relevant information regarding the CVR and FDR (as applicable) should be contained in the aircraft operator's documentation as follows:

- The AFM and SOPs should articulate required operating procedures;
- The MM should detail the required maintenance procedures; and
- The MEL should specify the conditions under which flight can be undertaken with either piece of equipment unserviceable.

Maintenance records must confirm that required and approved maintenance intervals and procedures are being followed.

13.11: Upper Torso Restraint

All helicopter and single-engine aeroplane crew and passenger seats must be fitted with upper torso restraints and be worn at all times.

FLT 1.13.11
MNT 3.01.02

The use of seat belt extensions that interfere with the full effectiveness of the upper torso restraint is prohibited.

Survivability of an aircraft accident is influenced by the following aspects:

- A liveable structure during the impact sequence;
- The impact forces transmitted to the occupant;
- Occupant retention;
- Post-crash fire; and
- Evacuation.

The US National Transport Safety Board (NTSB) conducted a study regarding general aviation crashworthiness where analysis of data from 1,982 accidents revealed that shoulder harnesses:

- May have prevented 20 percent of the fatalities; and
- Significantly reduced 88 percent of the original serious injuries found in the survivable accident data (refer to NTSB/SR-85/01 for details).

All aircraft must be equipped with restraint systems that meet the minimum certification standards for the specific aircraft. The restraint system for each forward-facing or aft-facing seat in all helicopter and single-engine aeroplanes must consist of a safety belt, and a shoulder harness (three-point or four-point system), with a metal-to-metal buckle or latching mechanism. This provides the occupant adequate protection when exposed to dynamic loads to be expected in normal and emergency situations.

For helicopter operations, each front seat occupant is to be provided with, as a minimum, a restraint system that is fitted with a double-strap shoulder harness (four-point system). Aircraft may be fitted with a five-point system that provides an additional crotch strap.

Aircraft occupants, including flight crew, must wear lap belts and shoulder harnesses during all phases of flight unless the Pilot-in-Command directs otherwise in consideration of a valid operational or safety reason.

evidence

The aircraft operator's SOPs should provide directions regarding the mandatory wearing of seat belt/upper torso restraint (UTR) systems and the circumstances under which restraints for the upper torso can be removed. The aircraft operator should also provide a recommendation or policy that passengers should ensure their restraints remain fastened at all times while seated. Correct donning, wearing and removal of the UTR must be addressed in any pre-flight safety briefing.

The certification standard of the UTR must be demonstrated either through OEM data or Supplemental Type Certificate.

13.12: Limitations in Sideways Seating

FLT 1.09.09
FLT 1.13.11

Sidewards facing seats must be avoided during takeoff and landing, unless regulatory approved shoulder restraints are used and passengers are briefed on the importance of their use accordingly.

Research shows that the human body has less resistance to accelerative forces in the lateral than in the longitudinal direction. In an accident scenario occupants of sideways facing seats are more exposed to injury than occupants of forward or aft facing seats.

Tests conducted using sideways facing seats have shown that occupants of these seats cannot be adequately restrained during an accident sequence using the conventional lap seat belt. Unless a regulatory approved harness is fitted, the seats are not to be used during takeoff and landing.

evidence

Where an aircraft operator is using aircraft fitted with sideways facing seats, the aircraft operator must document a requirement that these seats are not to be utilized during takeoff and landing unless the aircraft is fitted with an approved sideways facing occupant restraint system. The aircraft operator must provide adequate guidance for crew to enable them to ensure that the approved harness is fitted correctly for passengers seated in sideways facing seats.

13.13: Crash Boxes

Company owned and operated landing sites supporting long-term operations must have a crash box accessible to personnel at the airfield or primary helipad.

Contents of the crash box must be tailored to the environment and aircraft type and at a minimum should include:

- Rescue axe;
- Bolt cutters;
- Crowbar;
- Grab hook;
- Hacksaw and six spare blades;
- Fire resistant blanket;
- Fire resistant gloves; and
- Adjustable wrench.

The equipment listed will be of use in the immediate response to an accident where rescue of personnel is required. The crash box must be readily accessible, located in the vicinity of the airfield or helideck and must be ready for use at all times.

The company should ensure a suitably provisioned crash box is made available at an airfield or helipad. The relevant documentation must include a list of contents, the location of the crash box and the inspection schedule.

13.14: Rescue Firefighting

All company owned or operated helipads or airfields must have a means of providing a fire response capability commensurate with the potential risk. Personnel must receive training on the equipment provided.

A rescue firefighting capability will focus on providing a first response capability for the rapid evacuation of an aircraft's crew and passengers in an emergency scenario. This capability will vary depending on the size of the aircraft being operated.

Key principles for the provision of a rescue firefighting capability supporting resource sector operations include:

- The level of firefighting capability should be risk-assessed as being appropriate for the activity undertaken;
- Personnel tasked with a firefighting role should receive appropriate initial and recurrent training on the likely scenarios and the equipment being used;
- Annual exercises using the firefighting resources should be conducted;

- As close to contract start as possible, flight crew supporting long-term contracted operations should provide an overview of the contracted aircraft basic fire considerations to supporting rescue personnel. This should include location of aircraft fuel tanks, emergency exits and their external operation, wheel brake areas likely to get hot in high speed aborts and basic aircraft fuel isolation; and
- A discussion on the various types of fire suppression, including compressed air foam systems, and their relative merits should be conducted with firefighting specialists when required.

Where the airfield or helideck has a firefighting capability established, the capability should be supported by a risk assessment confirming acceptance of the capability.

Firefighting equipment should be subject to regular inspection, tagging and testing and personnel should have initial and recurrent training appropriate to the tasks assigned to them.

13.15: Insurance

ORG 2.02.01

It is the responsibility of the contracting company to determine the level of insurance required in accordance with company risk management standards.

Such insurance must not be cancelled or changed materially during the course of the contract without at least 30 days written notice to the company.

The company must be named as additional insured under the contract.

Insurance forms a necessary part of any recovery from an incident or accident. The company should ensure sufficient insurance cover is in place and that aircraft operators have the necessary insurance in place as part of their AOC and approval to operate.

The company should ensure that the aircraft operator's insurance meets their expectations and that the company is nominated as additional insured.

evidence

The aircraft operator should have statements of insurance cover that state the level of insurance carried for both hull loss events and per passenger.

A HELICOPTER EXTERNAL LOAD OPERATIONS

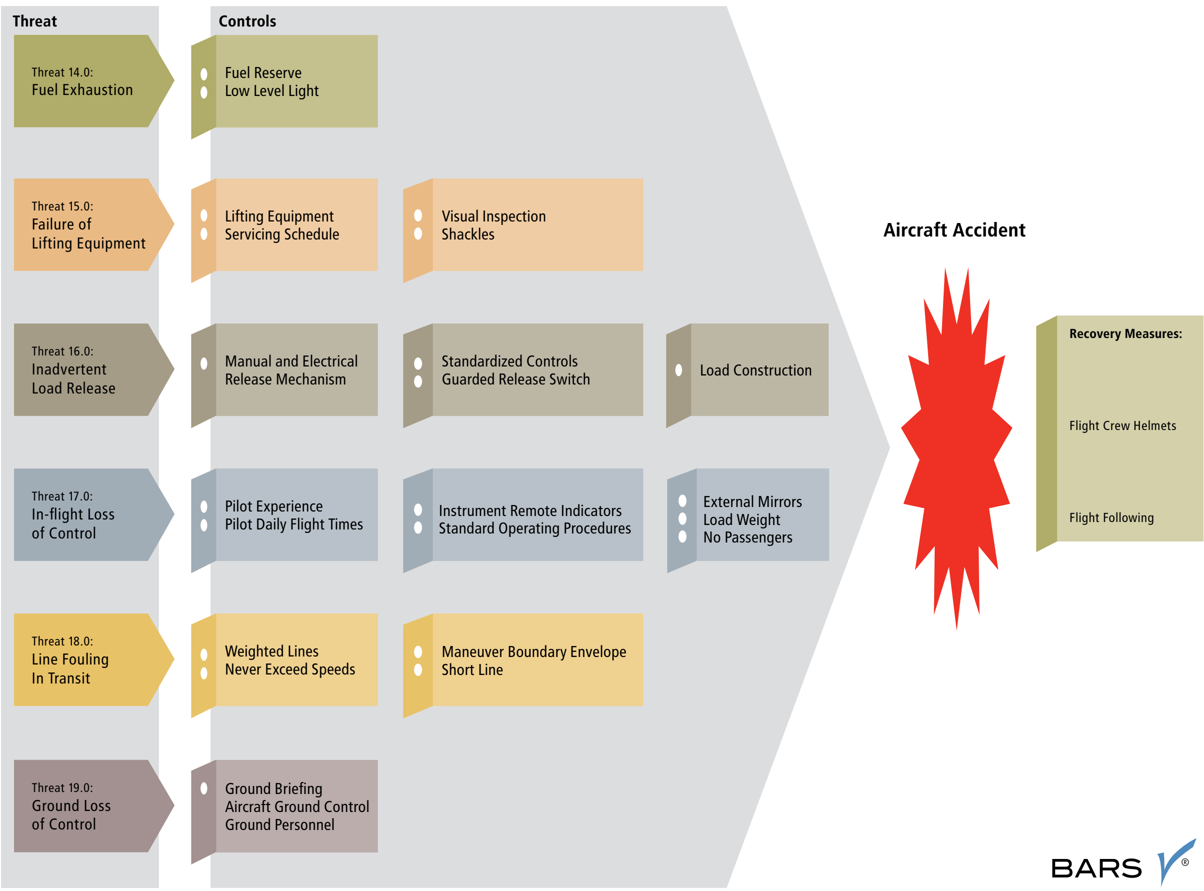
Helicopters provide the operational flexibility to move cargo and/or to perform low-level geophysical operations, using an external underslung load.

The critical controls essential for the conduct of minimum-risk external load operations are:

- Certified, in-date and serviceable external load equipment and rigging;
- Qualified, experienced, current and competent riggers and flight personnel;
- Serviceable helicopter suitable for the load/environment;
- Fuel management;
- Suitable pick-up and set-down areas;
- Aircraft performance margins, particularly when pick-up and set down are at different density altitudes; and
- Standard Normal and Emergency Operating Procedures with accompanying training.

Expanding on and implementing these critical controls allows risk mitigation measures to be applied to any external load activity, whether onshore or offshore. Control self-assessments using the following standards helps to determine the localized controls required and provides the company with an assessment of their effectiveness.

Figure 7: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and Recovery Measures for External Load Operations.



14.0: Fuel Exhaustion – External Load Operations

The helicopter operates on minimum fuel load to maximize lifting capability and runs out of fuel and suffers an engine flame-out resulting in an accident

To improve lifting capability, the helicopter's operating weight is minimized in order to maximize the external load weight that can be carried. After the helicopter's operating weight has been reduced to a minimum by the removal of non-mission critical equipment, the only variable remaining to reduce the operating weight is fuel.

External load activities are conducted in Visual Flight Rule (VFR) conditions and are generally:

- Within relatively short distances of the operating base; and
- In close proximity to accessible refueling points.

These factors support minimizing the reserve fuel carried to maximize the external load weight capability. However, operating with reduced fuel margins can only be conducted when all fuel management controls are risk-assessed and complied with as briefed and planned.

14.1: Fuel Reserve

Maintain a minimum fuel reserve of 20 minutes at all times. FLT 5.03.08

Unless more reserve fuel is required to be carried following the completion of a risk assessment or by the applicable regulatory authority, flight crew engaged in external load operations must ensure that a minimum "fixed" reserve of fuel is carried to allow for 20 minutes of flight.

Carriage of this reserve fuel is intended to provide for unplanned maneuvering in the vicinity of the landing site. This reserve fuel would normally be retained in the helicopter upon final landing.

For those helicopter types where illumination of the low fuel light requires the helicopter to land immediately or "as soon as practicable", a specific risk assessment should be conducted to determine the minimum fuel requirements that satisfy the intent of this control.

evidence

Aircraft operators must include these requirements in their Operations Manual or SOPs as a responsibility of the Pilot-in-Command. The 20 minute fuel reserve must be expressed in the same terms as the helicopter fuel gauges (pounds, kilograms, gallons, liters or percentage).

14.2: Low Level Light

FLT 5.05.02

When available for the aircraft type, a fuel low level warning light must be fitted.

The fuel low level light, when illuminated, provides cautionary advice to the flight crew that the quantity of fuel on-board has reduced to a low level and action must be taken to terminate the flight before fuel exhaustion. Flight Manual instructions may differ between helicopter types, typically requiring the flight crew to "land immediately", "land as soon as possible" or "land as soon as practicable".

Where a Supplement or STC is available, it is preferable to have the fuel low level light linked to the Master Caution system to increase the alerting level provided to flight crew.

Regardless of the Flight Manual requirements, the flight crew must understand the actions required of them if the low level light illuminates. This includes having detailed knowledge of the aircraft fuel system and how much usable fuel remains when the light illuminates.

When use of the low level fuel light is relied upon, such as external load operations, regular calibration of the low fuel detection system should occur and be part of the System of Maintenance of the aircraft.

evidence

Where a fuel low level warning light system has been fitted to a helicopter, it should be referenced in the AFM (possibly as a Supplement or STC). Aircraft operators must include these requirements in their Operations Manual or SOPs as a responsibility of the Pilot-in-Command. The applicable MM and/or SoM must address the ongoing maintenance and calibration requirements (minimum annually) applicable to the system installed.

15.0: Failure of Lifting Equipment – External Load Operations

The lifting equipment fails and drops the load resulting in an accident on the ground

Certified, in-date and serviceable external load equipment is a critical control in any external load activity. External load equipment includes everything from the belly hook of the aircraft downwards. This incorporates the line, swivels, shackles, D-rings, straps, nets, baskets, welded lifting lugs, bags and anything used to secure or support a load.

A disciplined and rigorous assurance process using the following controls will assist in preventing failure of lifting equipment:

- Certified to manufacturer's requirements by appropriately qualified personnel, and within the certification period (in-date);
- Periodic scheduled servicing by appropriately qualified personnel in accordance with the aircraft operator's maintenance schedule;
- Each item is stamped and/or "tagged" showing its certified load rating, and its compliance with certification dates and servicing cycles;
- Assessed as serviceable by maintenance personnel after each use before return to store;
- Maintained in the aircraft operator's maintenance system in accordance with the requirements of aircraft parts;
- Assessed as serviceable before use by ground/flight crew;
- Securing shackle pins (e.g. lock-wire) to prevent accidental load release; and
- Returning the equipment to the aircraft operator immediately after use and ensuring that it is not used for any other purpose.

15.1: Lifting Equipment

The aircraft operator must ensure the serviceability and certified safe working load of lifting equipment is adequate for the task and appropriate to the material used for the line. MNT 4.02.05

Failure of lifting equipment has been a significant cause in the loss of loads in-flight.

Certification of the lifting lines by personnel who have been trained in the Original Equipment Manufacturer's (OEM's) requirements is essential. Use of lines not certified or without appropriate certification documents must not be permitted.

Based on industry standards the ultimate breaking strength of rigging must be five to six times the safe working load of that rigging. The safe working load limit of the line must be a minimum of 5:1 and pre-determined as being capable of lifting the planned load prior to use. Most certified rigging equipment will be provided with a 6:1 ratio.
Work Load Limit charts are available from the lifting equipment OEMs.

The aircraft operator must retain records reflecting that any lifting equipment has been certified for use by the equipment manufacturer, has been tested and released to service by the approved maintenance organization and has been subject to a manufacturer's approved maintenance program.

Associated records must confirm that requirements of the lifting equipment manufacturer's approved maintenance program are being appropriately carried out.

15.2: Servicing Schedule

MNT 4.01.01

Lifting equipment must conform to a servicing schedule that provides all necessary documentation associated with inspections, certification and serviceability. Copies of this servicing schedule must be made available to the aircraft operator's representatives in the field.

All lifting equipment must be tracked using a documented and auditable servicing schedule. As with certification requirements of the lifting equipment, the servicing schedule relies on appropriate tagging of the equipment. Metal tags are the preferred method as synthetic nylon tags have been known to deteriorate. Most synthetic lines should not be color coded on the line itself (unless they are provided in a manufacturer's color scheme), as long-term degradation of the material in contact with the paint can occur. Color coding on steel is acceptable.

Lines without any form of identification or tagging must not be used and must be taken out of service until re-certification can occur.

All re-certification, scheduled servicing and any other checks must be documented by the aircraft operator on an external load lifting equipment register and the register must be available for reference by the staff operating in the field.

Where lifting equipment is provided by a third party, for example a contracting "client", the aircraft operator must ensure that any lifting equipment provided meets these maintenance, certification and tagging requirements.

The aircraft operator must maintain records, or have access to third party records, showing that all lifting equipment has been certified for use by the helicopter or equipment manufacturer. The records must also show that the equipment has been tested and released to service by the approved maintenance organization and that it has been subject to a manufacturer's approved maintenance program.

15.3: Visual Inspections

MNT 4.01.02

All lifting equipment (cables, lines, straps, baskets, swivels, clevises, etc.) must be inspected by qualified personnel daily prior to the flight. Any signs of wear, fraying, corrosion, kinks or deterioration must result in the equipment being withdrawn from use.

To supplement the certification process, a daily inspection by qualified personnel such as the Pilot, Load Master or other qualified and trained personnel in accordance with all OEM requirements will assist in mitigating the risk of equipment failure. Qualified personnel can include personnel trained by the aircraft operator, external load specialists or through accepted industry training programs. Early detection of impending equipment failure will ensure that defective equipment is removed from service and returned for repair or discarded.

All external load activities, schedules and plans must allow adequate time for the aircraft operator's personnel to perform all necessary checks on load equipment prior to the day's tasking.

evidence

The aircraft operator must document in their Operations Manual and SOPs that all lifting equipment is subject to a daily serviceability inspection by qualified personnel prior to use. Such procedures must clearly state requirements for the removal of equipment from service if found to be not in a fully serviceable condition. Associated records must confirm that requirements for daily inspections of lifting equipment are being appropriately carried out.

15.4: Shackles

MNT 4.02.01

The shackles used to connect the cable to the aircraft must conform to specific Flight Manual supplements regarding the diameter of the shackle rings and their use with respective hook types on the aircraft.

Shackles provide a method of attaching load lines to the aircraft and the load line to the load itself. The shackle, ring or device used to connect the load to the hook must be compatible with the hook. A review of accidents involving under slung loads reveals that the use of the incorrect size and shape of the shackle that links the load to the hook has contributed to a number of dropped loads. An incompatible shackle raises the potential of:

- Unintended release (dynamic roll-out) where the shackle (or ring) collapses the hook "keeper", allowing the load to detach from a closed hook; and
- The load not releasing when intended due to the ring jamming on the hook assembly.

If there is no Flight Manual supplement available, a pre-start operational risk analysis should be conducted to confirm the correct shackle size is being used.

evidence

The aircraft operator must document procedures that require shackle rings used in external load operations to meet the design specification of the equipment fitted to the helicopter and as detailed in the applicable AFM supplement.

16.0: Inadvertent Load Release – External Load Operations

The load is inadvertently released in-flight, falls to the ground and causes an accident

A dropped external load poses a serious risk to personnel and ground facilities and probable destruction of the load. The risk of part of the disconnected load or external load equipment striking part of the helicopter should not be discounted. Risk mitigation strategies must consider human failures as well as technical failures as both classes of failure have been well documented in previous incidents.

16.1: Manual and Electrical Release Mechanism

MNT 4.02.02

The aircraft must have a serviceable cockpit manual and electric release mechanism and an external manual release at the hook.

Pilots releasing external loads will normally utilize the cyclic or collective mounted electrical release switch. However, if an electrical release mechanism fails or if there is a total electrical failure, the alternate system of the cockpit mounted manual release system will have to be used by the pilot. Ground crews also have the capability of releasing the load from underneath the helicopter using the hook mounted release mechanism should the need arise.

Both the manual and electrical hook release systems should be checked and functionally tested before commencing hook operations each day, and each time the hook assembly is fitted to a helicopter.

evidence

The aircraft operator must document procedures that require all lifting equipment to be subject to a daily serviceability inspection by qualified personnel prior to use. Such procedures must contain requirements for the daily inspection of manual and electrical hook releases to ensure the serviceability and correct operation of this equipment.

Associated records must confirm that requirements for daily inspection requirements are being carried out.

16.2: Standardized Controls

When practical for aircraft of the same or similar type, the aircraft operator must standardize electrical load release switches, particularly when located on the cyclic and collective controls. MNT 4.02.07

Misidentification and selection of a cyclic or collective hook release switch has been a significant cause of inadvertent load release during external load activities.

Standardization of release switches will play an important role in minimizing the occurrence of human error. Aircraft operators should standardize the switches in their aircraft fleet that are to be operated by the same pilots. At a minimum the same type and model of aircraft used on the same external load operation must have standardized switches. However, this philosophy should also extend to all aircraft of the same model and type, and where practical, to different types of helicopter if the aircraft operator's flight crew are operating more than one type.

If standardized switches have not yet been fully implemented, detailed differences training must be provided to all flight crew until such time as the standardization can occur.

Where dedicated helicopters are to be used on an external load campaign, verification and assurance of standardized controls throughout the contracted fleet should occur prior to contract start.

evidence

Inspection of a representative sample of helicopters in an aircraft operator's fleet should confirm that, in accordance with the aircraft operator's policy and equipment design requirements, the layout of all external load release switches is standardized on helicopters of the same or similar type. Where an electrical load release switch is fitted to a helicopter, it should be referenced in the AFM (possibly as a supplement or STC).

Differences training must be provided where there is still a non-standard fitment throughout the aircraft operator's fleet.

16.3: Guarded Release Switch

When available for the aircraft type, all electrical release switches must be guarded to prevent inadvertent activation. MNT 4.02.03

One of the design standards for aviation is that a two-stage activation process should protect critical systems. The two-stage process comes in many forms, and can involve the use of "gates" or lift-and-throw type switches. The primary design philosophy is to protect against inadvertent selection by introducing the requirement for the flight crew to go through two separate and distinct processes before a system can be activated.

To protect against inadvertent activation of the external load release switches, guards should be fitted to all electrical release switches where possible.

Whenever non-standard conditions within company operations or equipment exist, appropriate differences training on the equipment type must be developed. The training must be documented as having been provided to all flight crew involved in the external load operation.

Where dedicated helicopters must be used on an external load campaign, verification and assurance that guarded release switches are in place should occur prior to contract start.

evidence

Inspection of a representative sample of aircraft in an aircraft operator's fleet must confirm that, in accordance with the aircraft operator's policy and equipment design requirements, each electrical load release switch is guarded to prevent inadvertent activation. Where an electrical load release switch is fitted to a helicopter, it should be referenced in the AFM (possibly as a supplement or STC).

16.4: Load Construction

FLT 5.03.09

The aircraft operator must ensure that all loads are rigged by qualified personnel.

The integrity of an external load can be affected by many factors including the load's rigging, shape, size, length and distribution. External loads are subject to a wide variety of forces in-flight and the aerodynamic effects on loads cannot always be anticipated. Qualified personnel must always be used during the load preparation phase as they will be best able to anticipate the load construction and restraint requirements.

While the Pilot-in-Command of a helicopter performing an external load operation has final responsibility for the acceptance of any load to be carried, only personnel who have been appropriately trained and qualified must be authorized to perform rigging of the load. Personnel such as qualified Load Masters or aircraft operator's specialists must be trained and qualified using recognized industry training programs that utilize manufacturer standards and rigging procedures.

Electromagnetic or mechanical swivels must be used in conjunction with load equipment to allow rotational movement of the load and avoiding twisting. In an electromagnetic swivel, an electric current continuously passes through the rotary connector of the swivel. All swivels should be certified and appropriately rated for the load carried.

Aircraft operators' documentation, or third party riggers' documentation, must include guidance for rigging of loads carried by various means. This includes loads carried on pallets within nets, long loads requiring the use of pipe-hooks, use of unequal lines for slender lengthy loads liable to swing, loads containing flammable liquids or other hazardous materials, and loads likely to have aerodynamic characteristics.

evidence

The aircraft operator's Operations Manual must detail the roles and responsibilities of personnel assigned to construction and rigging of loads that must be carried in helicopter external load operations. It must also include the details of the training that must be provided to personnel appointed to these positions and the process by which their ongoing competencies are assured.

Associated records must confirm that the requirements have been applied in the training and qualification of personnel who are allocated duties associated with construction and rigging of loads that must be carried in helicopter external load operations.

Approved rigging manuals document correct rigging procedures for various load types.

17.0: In-flight Loss of Control – External Load Operations

Poor manipulative control in-flight results in a loss of control and an aircraft accident

The safe carriage of an external load requires strict adherence to several controls. The manipulative handling of the aircraft by the pilot is as important as having certified, serviceable equipment supporting a well-constructed load.

The complexity of external load operations is further increased by engines and transmissions operating close to their limits, pilots being remotely located from the load and the lack of normal visual reference available during many operations.

The load itself can create handling issues for pilots especially if the load swings or oscillates, or tends to "fly" causing increased pilot responses that can sometimes become impossible for the pilot to manage.

The ability to perform external load work requires specific training by flight crew to ensure that all the necessary manipulative skills are developed as well as an understanding of how to deal with unexpected load deviations in-flight.

17.1: Pilot Experience

FLT 5.01.01
FLT 5.01.02
FLT 5.01.03

Pilots engaged in external load activities must comply with the following requirements:

- ***Successful completion of operator's external load training program tailored to vertical reference operations, and the long-line (>50 feet), or the short-line (<50 feet), whichever is applicable;***
- ***At least 200 hours external load operations, 100 of which must be vertical referencing (if used in that role); and***
- ***An annual long-line and/or external load base check with designated check and training personnel.***

(See also Common Control 1.2: Flight Crew Qualifications, Experience and Recency.)

The aircraft operator must not assign a Pilot-in-Command as an operating crew member of a flight engaged in external load operation unless they meet the minimum experience and recency requirements of either the BAR Standard or the responsible regulatory authority (whichever is the more stringent).

evidence

The aircraft operator must document in the Operations Manual, minimum qualification and experience requirements for flight crew engaged in external load operations that reflect both the minimum standard for the roles as defined in the BAR Standard and that may be required by the responsible regulatory authority.

Details of the aircraft operator's training and checking program for external load training (long line/short line as applicable) must be published in the Operations Manual and follow established criteria. The program must cover requirements and procedures for initial training and approval along with the processes for conducting periodic recurrent training and checking (annual long-line and/or external load base check).

Associated pilot training records must confirm that applicable requirements of the training program have been applied in the training of pilots engaged in external load operations and the ongoing annual evaluation of pilot competency (long line and/or short line as applicable).

Flight crew files and rostering records must confirm that crew assignments are appropriate to meet the task requirements.

17.2: Pilot Daily Flight Times

FLT 5.02.01

Where the external load moves are more than three per hour, comply with the following flight times:

Single-pilot operation	Two-pilot operation
3 hour maximum flight time per flying period, followed by a 30 minute rest break. Hot refueling does not constitute a rest break.	5 hour maximum flight time per flying period, followed by a 60 minute rest break.
6 hour maximum flight time per calendar day.	8 hour maximum flight time per calendar day.

High repetition external load work is considered more fatiguing than normal operations due to the high levels of concentration required by the flight crew. Limitations imposed on the flight times, duty periods and rest requirements for flight crew are established to minimize the effects of fatigue and to ensure that flight crew are performing at adequate alertness levels to enable safe flight operations.

evidence

Details of the aircraft operator's Flight and Duty Time management program should be published in the Operations Manual and where helicopter external load operations are undertaken, must reflect the limitations detailed in the BAR Standard (unless the responsible regulatory authority's requirements are more stringent).

Associated Flight and Duty Time records must confirm compliance with all requirements of the Flight and Duty Time limits that are applicable. The Flight and Duty Time records that are maintained must be consistent with information provided in other documents such as aircraft flight records.

17.3: Instrument Remote Indicators

FLT 5.05.01

For single-pilot operations using vertical referencing techniques, and where the aircraft instruments are not in the pilot's scan, a remote indicating fire warning light and torque gauge must be fitted where available for the aircraft type.

Where single-pilot, external load operations involving vertical referencing (long-line) are to be conducted, instruments and/or indicators that enable the pilot to monitor critical aircraft operational limits should be provided in a position that is within the pilot's field of view when observing the load. Provision of a remote First Limit Indicator (FLI) or remote torque gauge and fire warning lights can considerably reduce risks and pilot workload during an operation that is demanding. Audio outputs indicating the same parameters routed through the pilot's headset may be considered as an adequate alternative.

evidence

Inspection of the aircraft operator's helicopter fleet should confirm that remote FLI or fire warning lights and torque gauges that facilitate monitoring during single-pilot, vertical referencing external load operations are fitted. Where a remote FLI or fire light and torque gauge are fitted to a helicopter, it should be referenced in the AFM (possibly as a supplement or STC).

17.4: Standard Operating Procedures

The helicopter operator must have Standard Operating Procedures outlining all requirements of personnel engaged in the external load activity. The procedures must be relevant to the local environment and terrain being operated in.

Aircraft operators undertaking external load operations must ensure that training and checking programs are implemented to provide for initial and recurrent training and checking of all flight crew and ground personnel assigned external load duties.

The external load operations training and checking program must be documented in the Operations Manual and follow established training and checking criteria. The aircraft operator's training policies and program should be tailored to suit the experience and aptitude of the individuals being trained as well as the equipment to be used in the proposed role. The training program must ensure that training objectives are achieved and that individual competencies and required safety standards are being maintained.

The program must provide initial and recurrent training and checking for specific personnel that is commensurate with the duties they must perform and should at a minimum address:

- Equipment used;
- Inspection, overhaul and recertification of all applicable equipment;
- Load construction;
- Ambient conditions of the operating environment and the effect of density altitude;
- Crew duty and responsibilities;
- Communications – normal and abnormal (radio failure);
- Hand signals;
- Flying techniques, including load controllability assessment versus airspeed (V_{NE} with a load attached); and
- In-flight emergency procedures.

The aircraft operator must not assign a pilot or ground crew to perform duties associated with an external load operation unless that person has completed all necessary requirements of the aircraft operator's training and checking program and has been confirmed as being competent to act in the assigned role. Such requirements must be applied to all applicable personnel irrespective of their employment basis (e.g. full-time, free-lance, part-time or casual).

evidence

Details of the aircraft operator's external load training and checking program must be published in the Operations Manual and follow established training and checking criteria. The syllabuses and procedures for conducting initial and periodic external load training and checking must also be documented.

Associated training records must confirm that the documented requirements have been applied in the training, approval and ongoing evaluation of competency for personnel assigned to duties associated with external load operations during both normal and emergency situations.

17.5: External Mirrors

MNT 4.02.04

Where available for the helicopter type, external mirrors showing the hook area must be fitted to the aircraft. Where fitted, the mirror must not interfere with the design and operation of the Wire Strike Protection System (WSPS).

The provision of external mirrors enables the flight crew to gain the necessary assurance that the hook area and line attachment are correctly configured and operating normally. It provides a final check to the flight crew that the load is securely attached and electrical connections (if fitted) are correctly made.

evidence

Inspection of the aircraft operator's helicopter fleet should confirm that external mirrors that permit viewing of the hook area during external load operations are fitted in accordance with the aircraft operator's policy. Where external mirrors are fitted to a helicopter, they should be referenced in the AFM (normally as a supplement or STC).

17.6: Load Weight

FLT 5.03.01
FLT 5.03.02

All loads must have accurate weights provided to the pilot before each lift. Standard load plans can be used as long as the weights are accurately known (e.g. compressors, rig break-down, sample bags, etc). A load meter must be fitted to the aircraft if considered necessary during the pre-start risk assessment.

(See also Control 7.2: Cargo Weight and Loading, Control 7.3: Load and Trim Calculations.)

Control of the weight of external loads is essential for the safe conduct of each operation. The weight of external loads must be made available to the Pilot-in-Command before each flight. Care must be taken to ensure that the weight of straps, slings, hooks, swivels, etc. is included in the total weight to be lifted.

When a load meter is fitted to the aircraft type, it must be positioned such that the load information is in view of the flight crew whilst maintaining control of the aircraft.

evidence

The aircraft operator's documented procedures must include the requirements and processes to determine the weight of the external load to be lifted for each flight and the procedure to ensure that accurate weight information is provided to the pilot before each lift.

Where standard loads are carried, the aircraft operator's Operations Manual must specify the circumstances under which standard load information may be used to ensure that standard load weights are only used when accurately known.

17.7: No Carriage of Passengers

FLT 5.03.07

Only personnel who are employed or contracted by the aircraft operator to accomplish the work activity directly associated with that operation may be carried on helicopters during external load operations. This includes transit with an empty line attached.

Passenger carrying activities and external load activities should be treated as two separate and independent tasks. Only personnel who are essential to the safe conduct of an operation must be carried on-board the helicopter during external load operations. If a helicopter has a dual role of carrying passengers and external load activity, normal fuel reserves (BARS Control 3.5) must be used for all passenger carrying activities.

evidence

The aircraft operator should include a requirement in the Operations Manual that only personnel who have a role that is directly related to the safe conduct of an external load operation are carried on helicopters during each flight, including those where no load is attached to the external line.

Observations of operations where possible, can confirm compliance with the aircraft operator's requirements that no passengers must be carried during external load operations.

18.0: Line Fouling In Transit – External Load Operations

The load becomes detached from the line or the line is flown empty which, when above a certain speed, causes it to stream up and rearwards into the tail rotor resulting in an accident

A long-line is any line that is 50 feet or greater in length.

A short-line by definition is less than 50 feet in length, but should also have the added restriction of not being able to reach the tail rotor of the aircraft type being flown.

Long lines are inherently unstable when flown above certain speeds. Unweighted lines will always drop vertically down from the hook when the helicopter is hovering and will begin to trail behind the helicopter as the speed is increased. The angle at which they trail is proportional to the forward airspeed of the aircraft, as too is the instability of the line.

The aerodynamics of an unweighted line are unpredictable and there have been many accidents caused when the long line has streamed to a position where contact with the tail rotor has occurred with the subsequent loss of control of the helicopter.

18.1: Weighted Lines

FLT 5.03.03
FLT 5.03.04

The long-line must be suitably weighted if it is to be flown without a load attached. Implement pre takeoff checks which are designed to ensure flight crew involved in repetitive loads are aware of when the line is attached.

The most common risk mitigation strategy to prevent long line streaming into the tail rotor is to add a minimum weight to a long line, in order to alter the mass and aerodynamic characteristics.

The short-line should never be able to reach the tail rotor of the helicopter type being used, and should never be flown without a load attached.

The aircraft operator should have published in its Operations Manual a restriction on flying with unladen long lines and publish a minimum mass that is required to be attached to a long line when the line is flown without a load attached.

Pre takeoff checks must include confirmation of a long line attachment to the aircraft.

Observation of flight operations where possible can confirm compliance with the aircraft operator's procedures and that transit with a long-line and no load attached is prohibited unless the minimum mandatory weight is attached.

18.2: Never Exceed Speeds (V_{NE})

All applicable V_{NE} speeds must be briefed and understood by all flight crew prior to the commencement of operations. If the aircraft Air Speed Indicator (ASI) is calibrated in different units of measurement than the documented V_{NE} speeds, a separate risk assessment must be conducted and reviewed with a Competent Aviation Specialist prior to start.

FLT 1.12.04
FLT 5.02.07

The maximum airspeed achievable with varied external cargo shapes is limited by controllability. Care should be taken when carrying external cargo as handling characteristics may be affected due to size, weight, and shape of cargo load.

The V_{NE} for carriage of external loads set by the manufacturer is usually derived from the aircraft's response after releasing a load in-flight due to emergency.

Some loads have a natural tendency to "fly", such as boats or flat packs that can act like a wing. In these cases the stated V_{NE} may be too excessive and the pilot must reduce the maximum forward airspeed as required. Maximum operational air speed with external loads is dependent upon the load configuration and sling length and it is the aircraft operator's responsibility to establish the maximum operational speed for each specific configuration.

evidence

The aircraft operator must publish the V_{NE} speeds applicable to all helicopter types in its inventory capable of conducting external load operations. The V_{NE} speeds published must comply with manufacturer's data, extracted from the AFM. The Operations Manual should also include the process for determining a safe transit speed during all external load operations. The process must detail an incremental increase in airspeed based on load stability and the recovery measures to be used if the load becomes unstable.

Observation of flight operations where possible, can confirm compliance with the aircraft operator's published procedures and limitations.

18.3: Maneuver Boundary Envelope

All safe transit speeds, the maximum angle of bank, the maximum allowable rate of descent and general handling associated with stable load operations must be briefed and understood by all flight crew prior to the commencement of operations.

FLT 5.02.02
FLT 5.02.03
FLT 5.02.04
FLT 5.02.05

Carrying an external load attached to a helicopter degrades stability and handling qualities, and reduces the operational flight envelope by comparison to a helicopter with no load. The safety of an external load operation relies on flight crew having a full knowledge and understanding of the way in which carriage of an external load will affect the handling characteristics and limitations of the helicopter.

The aircraft operator's SOPs must clearly specify a requirement for all flight crew to have a full knowledge and understanding of the way in which carriage of an external load will affect the handling characteristics and limitations of the helicopter. In multi-crew operations, the aircraft operator's documented SOPs should detail how the crew work together, including specific detail on the conduct and content of pre-flight briefings to ensure that crew members are aware of, and understand the effect of, an external load on the helicopter's operational envelope. For single-pilot operations, the aircraft operator's SOPs should provide details of the relevant self-brief that should be completed by the pilot prior to commencing a flight. Load performance in-flight should also be addressed during an aircraft operator's External Load Training Program.

Observations of flight operation where possible, can confirm the suitability of the aircraft operator's procedures and compliance with them.

18.4: Short-Line (<50 feet)

FLT 5.03.05

Transit with a short-line and no load attached is not permitted.

A short-line by definition is less than 50 feet in length, but should also have the added restriction of not being able to reach the tail rotor of the aircraft type being flown.

Transit with a short line without a load attached must not be conducted. Best practice is to consider a short line to be part of the load; dropping or picking up the load is achieved by releasing/attaching the short line to the aircraft cargo hook.

The aircraft operator must clearly specify a requirement in the Operations Manual that flight with a short-line and no load attached is prohibited.

Observation of flight operations where possible, can confirm compliance with the aircraft operator's procedures and that transit with a short-line and no load attached is prohibited.

19.0: Ground Loss of Control – External Load Operations

A departure from normal operations on the ground results in loss of control of the load and aircraft and results in an aircraft accident

Helicopter external load operations by necessity are conducted while the helicopter is running. Risk factors such as noise, downwash, vibration, raised dust/snow/debris and turn-around time pressures all contribute to the high-risk nature of the activity.

Defences used in this high risk environment include training, qualification, experience and awareness of all personnel including both ground and flight crew. To ensure the levels of situational awareness are adequate, a clear understanding of the activity's purpose, associated procedures and individual and team accountabilities and responsibilities must be understood.

19.1: Ground Briefing

The pilot must ensure all personnel involved in the external load activity are briefed prior to the commencement of operations. This brief must include all emergency scenarios that could involve the ground crew.

FLT 5.02.06

The pilot should ensure a full and comprehensive pre-flight briefing is conducted with all personnel involved in an external load operation. An integral component of the briefing should be an assessment of identifiable risks that may be unique to that specific operation.

The briefing should:

- Cover all aircraft emergency scenarios and actions required by pilots and ground personnel;
- Include the assigned Load Master, hook-up person and marshaller (if required) and identification of same vests;
- Identify antennae, skid gear and other fuselage parts that can cause injury to personnel or damage to the helicopter;
- Discuss load sequencing with the Load Master, Pilot and crew on size, shape and weight with respect to the fuel burn and turn-around time;
- Reiterate how sling gear can get entangled on skids or other obstacles;
- Discuss potential static discharge and how to avoid it;
- Review wind direction and flight paths;
- Discuss the importance of areas being clear of debris and loose materials that can blow away, be sucked into rotors or cause injury to personnel;
- Confirm hand signals procedures;
- Confirm radio terminology to be used;
- Emphasize that no crew member should turn their back on the line or the load during all approach, hook-up and departure operations;
- Emphasize that all crew members should maintain eye contact with the line and/or load at all times during the final approach, maneuvering, and departure phases of the operation;
- Make it clear that ground personnel not essential to the hook-up operation must stay in recognized safe areas when the helicopter is operating;
- Make it clear that the load must be securely attached, and all ground members must be clear before the signal is given for the pilot to depart; and
- Make it clear that all ground members must wear appropriate PPE.

The aircraft operator's Operations Manual must specify a requirement that prior to commencing external load operations, the pilot must conduct a briefing with all personnel involved with the operation. This briefing should include all known aircraft emergency scenarios that could involve ground crew and encourage discussion of identifiable risks associated with the planned operation.

19.2: Aircraft Ground Control

FLT 5.03.06

A pilot must remain at the controls of an operating helicopter under power and whilst on the ground at all times. The controls must not be left unattended with the aircraft under power in any circumstances, even to assist in activities such as hot refueling or load attachment.

(See also Control 8.5: Pilot at Controls.)

Ground personnel in close proximity to a running helicopter on the ground have a high risk of being struck by helicopter main or tail rotors. During rotors turning operations, aircraft operators must minimize the risks to ground personnel by ensuring that a pilot remains at the controls at all times. The pilot must only be engaged in essential cockpit duties so that they can consequently devote their attention outside the cockpit to identify external hazards and monitor activities around the aircraft.

The aircraft operator must document in the Operations Manual the requirement for a pilot to remain at the controls of a helicopter that is under power and with the rotors turning at all times while on the ground.

19.3: Ground Personnel

FLT 5.04.04

Ground personnel must wear appropriate Personal Protective Equipment (PPE) including hard hats with chin straps, impact resistant goggles, gloves, safety shoes, high visibility vests and a means of ground-to-air communications with the flight crew.

Access to, and movements within, a lifting or dropping site should be strictly controlled and non-essential personnel must not be allowed to work in, or cross, the operating area when external load operations are taking place. All ground personnel who are required to perform functions supporting the external load operation must be provided with PPE to ensure that the risk of sustaining personal injuries during the operation is minimized. Although not stated in the control, the PPE requirements should include hearing protection such as helmets with incorporated hearing defenders.

The aircraft operator must document the PPE requirements that must apply to ground personnel involved in external load operations. Such requirements should include hard hats with chin straps, impact resistant goggles, hearing protection, gloves, safety shoes and a high visibility vest.

Where operations must be conducted in dusty conditions or if the load to be carried is likely to give rise to significant or harmful dust, ground personnel must be provided with suitable respiratory protection.

20.0: Aircraft Accident – External Load Operations

Mitigating defences in the event of an aircraft accident

Effort should be made to avoid incidents and accidents associated with external load operations and this includes the requirement to plan for a possible adverse outcome. The defences in Section 13.0 of the BAR Standard are applicable to external load operations, as are the additional defences listed below.

20.1: Flight Crew Helmets

Flight crew involved in external load activities must wear serviceable flying helmets that comply with industry standards. FLT 5.04.01 FLT 5.04.02

Aircraft operators should ensure that flight crew involved in external load operations wear an approved flight helmet with inbuilt communications capability and visor. The prime purpose of the helmet is to provide impact protection and thereby reduce the risk of head injury in the event of an accident.

evidence

Where external load operations must be conducted, the aircraft operator must document a requirement that a serviceable industry standard helmet must be worn by all flight crew while involved in such operations.

Observations of flight operations where possible, can confirm compliance with the requirements for serviceable flying helmets to be worn by flight crew involved in external load operations.

20.2: Flight Following

Positive continuous communication and flight following must be maintained with the aircraft either by ground support crew or designated flight following personnel. Operation normal calls must be scheduled at least every 30 minutes unless the risk assessment requires a greater frequency.

(See also Defence 13.5: Flight Following.)

The aircraft operator must ensure that where helicopter external load operations are being undertaken, continuous communication can be maintained with ground support personnel or designated flight following personnel. Flight following must be maintained with the aircraft through provision of scheduled "operations normal" calls that must be provided at intervals of 15 minutes but no greater than 30 minutes.

The ready availability of satellite flight following should the norm for all operations. In addition to assisting in locating downed aircraft, it can also provide useful coordination with multiple aircraft and drop schedules. In an external load environment, one minute reporting intervals for the satellite flight following is appropriate.

Where satellite flight following is in use (and operational), the frequency of scheduled operations normal calls should be addressed in the pre-start operational risk assessment.

The aircraft operator must ensure that personnel who are assigned to maintain contact with aircraft in these operations closely monitor the safety and progress of flights and are able to initiate the ERP if an emergency situation develops or if communications are lost.

evidence

Where an aircraft operator conducts helicopter external load operations, the Operations Manual should contain documented procedures that provide for such flights to be monitored by ground support personnel or designated flight following personnel.

The aircraft operator's SOPs include equipment requirements and procedures that will ensure that constant radio contact can be maintained and that "operations normal" reporting occurs at intervals of 15 minutes but not exceeding 30 minutes.

Available records should confirm that a log of required position reports is maintained as an integral component of the following of a flight's progress.

B AIRBORNE GEOPHYSICAL SURVEY OPERATIONS

Airborne geophysical survey operations are higher risk than other aviation activities in the resource sector. All proposed activities are subject to a detailed risk analysis that meets the standards of the company, aircraft operator and the IAGSA.

To achieve the data quality required from sensor packages either installed on or towed from the platform, airborne geophysical flying requires tight line tracking and adherence to height tolerances.

Airborne geophysical operations often require all available aircraft performance. Operation in this flight regime leaves little room for error in a high workload environment. As a consequence, manipulative skill by the flight crew coupled with appropriate fatigue management of the activity become critical controls for the safe conduct of the operation and are applicable to aeroplanes and helicopters.

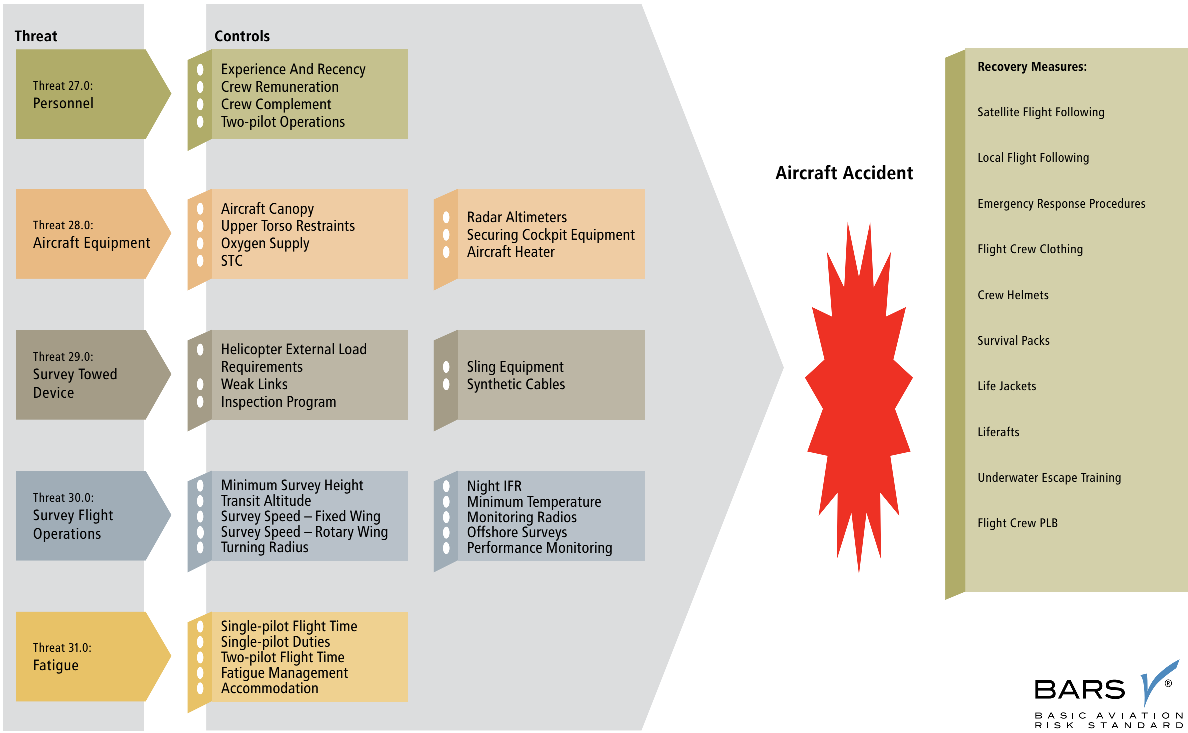
To reflect the increase in difficulty of this type of flying, geophysical operations demand greater role experience and more stringent risk controls than those contained in the generic requirements of the BAR Standard.

The assurance process for geophysical operations is no different to other specialist role flying activities and will comprise of a combination of: (1) BARS audits of the aircraft operator; (2) a detailed risk assessment prior to the activity; (3) start-up operational review when considered necessary from a risk-based perspective.

Critical controls for airborne geophysical flying will always include:

- Equipment;
- Personnel;
- Fatigue management; and
- Operational requirements.

Figure 8: BARS Bow Tie Risk Model – Airborne geophysical survey operations are higher risk than other aviation activities in the resource sector. All proposed activities are subject to a detailed risk analysis that meets the standards of the company, aircraft operator and the IAGSA.



27.0: Personnel

Inadequate experience or high workload causes poor decision making and results in an accident

27.1: Aircrew Experience and Recency

FLT 2.01.04
FLT 7.02.01
FLT 7.02.02

The following requirements are in addition to those listed in Appendix 1 of the BAR Standard.

Experience and Recency Requirement	Captain	Co-Pilot	Other crew	Footnote
All BARS Appendix 1 requirements	Yes	Yes		
Total time – geophysical	300 hours	10 hours		6
Command/ICUS time – geophysical	300 hours	0 hours		1
Command/ICUS on contract aircraft type	50 hours	0 hours		
Command/ICUS preceding 90 days on contract aircraft type	10 hours	0 hours		2
Geophysical training program	Yes	Yes	Yes	3
Simulator training	Yes	Yes		4
Helicopter Underwater Escape Training	Yes	Yes	Yes	5
Survey Crew Resource Management	Yes	Yes	Yes	

1. Agricultural pilots with formal ratings provided by a regulatory authority, who have at least 500 hours of low level agricultural flying incorporating GPS line flying, may apply a 250 hour credit towards total Command time.
2. Alternatively successful completion of a geophysical line check of at least two hours (excluding use of ferry time within the preceding 90 days). Document flight crew competencies against established criteria.
3. Successful completion of a geophysical training program and where applicable a mountain flying course. Document flight crew competencies against established criteria. Where the aircraft is operating with a fuel system that has been modified from the original certification criteria, include a specific training module on fuel system management.
4. In addition to training on the actual aircraft, when reasonably available and supported by the client, flight crew must undergo periodic simulator training that includes low-level emergencies and marginal performance situations (including V_{MCA}).
5. HUET training must be conducted for all crew involved in over-water ferry flights and offshore geophysical operations.
6. A geophysical orientated Competency-Based-Training (CBT) reviewed and endorsed by a Competent Aviation Specialist may be used.

(See also Common Control 1.2.)

27.2: Flight Crew Remuneration

FLT 7.01.02

To remove unnecessary pressure to fly and potentially compromise minimum standards, flight crews must not be paid on the basis of hours or distance flown.

When remuneration is based on hours or distance flown, there is a natural reaction to press further and farther, thereby introducing the possibility of additional risks such as fatigue, poor weather or the acceptance of less risk tolerance than would normally be present. Remuneration should be based on an agreed contract basis, unrelated to production rates.

evidence

The contract should reflect the remuneration method in place for the survey operation.

27.3: Crew Complement

The minimum crew complement must be a pilot and operator. Single-pilot only operations must only be accepted after conducting a risk assessment which delivers mitigation measures acceptable to all. Where an observer is carried due to operating country requirements, the observer is to be considered part of the crew.

All survey operations are high-workload events. In order to share the workload, two crew operations should be the norm. Where single-pilot operations are necessary for payload/performance or due to system design, the risk assessment must consider all facets of the operation that affect crew performance.

evidence

The aircraft operator should document the risk assessment and the factors taken into consideration.

27.4: Two-pilot Operations

FLT 7.05.01

Night surveys must be operated with a two-pilot crew. Conduct a pre-start risk assessment on two-pilot operations when:

- ***Performing low-level offshore surveys; and/or***
- ***Areas where a high workload is anticipated with managing traffic and/or airspace.***

evidence

The aircraft operator should document the risk assessment and the factors taken into consideration.

28.0: Aircraft Equipment

Certified and appropriate equipment must be fitted and serviceable prior to departure on a survey flight

28.1: Aircraft Canopy

To facilitate good lookout and field-of-view, the aircraft canopy and all transparencies must be clear, unscratched and serviceable throughout the activity.

Clean, clear canopies reduce flight crew workload by reducing glare and permitting the acquisition of terrain details earlier in the flight. Clean transparencies also permit the early identification of airborne hazards such as other aircraft or birds.

evidence

Inspection of the aircraft is more likely to occur as part of the Operational Review process, but may be undertaken during the BARS audit if a representative aircraft is available.

28.2: Upper Torso Restraints

MNT 7.04.06
MNT 7.04.07

Four-point upper torso restraints with lockable inertial reels must be provided to all aircraft occupants.

Four-point upper torso restraints provide greater energy absorption ability than the three-point lap/sash belt and therefore increase survival chances in the event of an accident.

evidence

Inspection of the aircraft is more likely to occur as part of the Operational Review process, but may be undertaken during the BARS audit if a representative aircraft is available.

28.3: Oxygen Supply

MNT 7.04.02

The aircraft must have continuous oxygen capability if unpressurized and operating above 10,000 feet AMSL.

The System of Maintenance for an aircraft equipped with an oxygen supply must include details of the inspection schedule for the oxygen equipment fitted to the aircraft to ensure its ongoing serviceability. The inspection schedule should reflect any requirements or recommendations of the equipment manufacturer or any conditions that may be applicable to the STC (or equivalent) that address fitment of equipment to the aircraft.

evidence

Aircraft maintenance records must confirm that documented requirements and procedures contained in the aircraft System of Maintenance (or equivalent) are being followed.

28.4: Supplemental Type Certificate (STC)

All role-specific equipment must be installed under an STC or Engineering Order. MNT 7.04.01

Geophysical equipment can often invalidate the aircraft's certification basis due to the modifications required to the basic aircraft design. Where geophysical equipment is fitted, it is critical that the certifying authority undertakes the modifications in accordance with approved engineering data; either an STC or through compliance with a specific Engineering Order (EO).

The aircraft operator and/or approved maintenance organization must be able to provide a copy of the applicable STC or EO for review. Inspection of the aircraft should confirm that any modifications have been completed in accordance with the applicable STC/EO.

28.5: Radar Altimeter

Equip the aircraft with either a dual output radar altimeter or two independent radar altimeters, fitted with visual and aural height warnings, and with a variable height alert that can be set by the crew. MNT 7.04.03

All geophysical survey aircraft must be equipped with at least one radio altimeter (single-pilot operation) or with two independent radio altimeters or dual displays (two-pilot operation), with audio and visual alert both of which must be serviceable for any flight. This requirement supersedes what may be outlined in the regulatory approved MEL.

The aural alerting function of the radio altimeters provides an additional awareness capability and should be used as a last line of defence to prevent a Controlled Flight Into Terrain/Water (CFIT/W) accident.

The aircraft operator must document in the Operations Manual or MEL, a requirement for the radio altimeter systems to be serviceable at the time of dispatch for any survey. Aircraft operator procedures should include the requirement for setting any aural alerting systems on the radar altimeter and the procedures to be followed in the event of an unexpected alert.

Aircraft records and Maintenance Release documentation can confirm compliance with these documented requirements.

28.6: Securing Cockpit Equipment

Any additional cockpit instrumentation (such as course deviation indication and/or heads-up instrumentation) must be properly secured and not obstruct the crew field-of-view. Instrumentation that requires input from a crew member must be within easy reach and within the normal operating field of vision.

Inspection of the aircraft is more likely to occur as part of the Operational Review process, but may be undertaken during the BARS audit if a representative aircraft is available.

28.7: Aircraft Heater

FLT 7.05.02

The use of an aircraft heater must not be restricted for crew use in the interest of 'clean' data.

evidence

The aircraft operator must document in the Operations Manual that use of the heater is unrestricted throughout the flight envelope associated with survey operations.

29.0: Survey Towed Device

Lifting equipment fails and the survey load drops to the ground causing an accident

29.1: Helicopter External Load Requirements

Helicopter external load equipment such as towed arrays must follow all requirements contained within Appendix 4 of the BAR Standard.

Complying with the requirements applicable to External Load Operations will ensure that all equivalent Controls and Defences are in place for this type of survey work.

29.2: Weak Links

Where a survey device is towed, install an approved weak link in the line that is certified for the purpose by the applicable regulatory authority and/or approved design/manufacturer facility. MNT 7.04.04

For helicopters the weak link must be positioned at the hook end of the cable near the helicopter. For aeroplanes it must be located near the device since it is winched in and out of the aircraft.

The device's data cable must be fitted in a similar manner with a suitably frangible link that releases from the aircraft when subjected to half the total mass of the towed device.

The weak link is a critical component of the towed array. In the event of the array snagging, the weak link should fail, separating the array from the aircraft and permitting safe flight away from the impact zone.

evidence

Inspection of the array is more likely to occur as part of the Operational Review process, but may be undertaken during the BARS audit if a representative sample is available.

29.3: Inspection Program

A documented inspection program approved by the Original Equipment Manufacturer (OEM) and/or design authorities must incorporate the following requirements: MNT 7.04.05

- ***All certification and design approval authorities (basis for design) of the equipment and devices;***
- ***Pre and post flight inspections documenting serviceability of all cables, shackles, survey devices, attachment points and associated hardware;***
- ***Maintenance procedures for part damage and/or wear including all relevant part numbers and critical design specifications of the device;***
- ***Emergency actions in the event of device load-bearing failure or ground vegetation contact; and***
- ***Failure modes of the load-bearing device and any associated aerodynamic effects.***

All survey equipment (cables, lines, straps, swivels, etc.) must be inspected by qualified personnel daily prior to the flight. Any signs of wear, fraying, corrosion, kinks or deterioration must result in the equipment being withdrawn from use.

To supplement the certification process, a daily inspection by qualified and trained personnel such as the pilot or Load Master, conducted in accordance with all OEM requirements will assist in mitigating the risk of equipment failure. Qualified personnel can include personnel trained by the aircraft operator, external load specialists or through accepted industry training programs. Early detection of impending equipment failure will ensure that defective equipment is removed from service and returned for repair or discarded.

All survey activities, schedules and plans must allow adequate time for the aircraft operator's personnel to perform all necessary checks on survey equipment prior to the day's tasking.

evidence

The aircraft operator must document in their Operations Manual and SOPs that all survey equipment is subject to a daily serviceability inspection by qualified personnel prior to use. Such procedures must clearly state requirements for the removal of equipment from service if found to not be in a fully serviceable condition. Associated records must confirm that requirements for daily inspections of lifting equipment are being appropriately carried out.

29.4: Sling Equipment

MNT 7.04.05

All slings must be made up of serviceable cables that are inspected in accordance with a servicing schedule. Current and traceable load test certifications for each cable must be documented. Each cable or cable assembly must have a swaging collar or other appropriate permanent marking to indicate length, diameter and rated strength of the item.

(See Control 29.3 for additional explanation.)

29.5: Synthetic Cables

Synthetic cables may be used if the operator can demonstrate that the cables do not exhibit excessive stretch when under load and are sufficiently weighted to ensure they do not interfere with the aircraft control surfaces or main/tail rotor at any time.

30.0: Survey Flight Operations

Flight operations outside a safe envelope places the operation at increased risk of Loss of Control In-flight (LOC-I) or Controlled Flight into Terrain (CFIT)

30.1: Minimum Survey Heights

The survey height is defined as the height above obstacle level, such as the top of a jungle canopy in a tropical environment or ground level in desert conditions. Where the survey height is nominated below 100 meters for aeroplanes, 60 meters for helicopters or 50 meters for a towed object, approval must be based on a risk assessment and agreed by all parties.

evidence

The accompanying risk assessment should document the survey height and the mitigating factors taken into consideration. The risk assessment should be available for review by the Competent Aviation Specialist as part of the pre-survey review process.

30.2: Transit Altitude

Transit altitude must be above 500 feet above ground level.

evidence

The accompanying risk assessment should document the survey transit altitude and the mitigating factors taken into consideration. The risk assessment should be available for review by the Competent Aviation Specialist as part of the pre-survey review process.

30.3: Survey Speed – Fixed Wing

For all fixed wing aircraft the minimum safe survey speed must be calculated using the greater of: FLT 7.05.05

- ***130% of clean stall speed (V_S);***
- ***110% of best single-engine rate of climb speed (V_{YSE}) if applicable; or***
- ***Minimum safe single-engine speed (V_{SSE}) if published.***

Minimum speeds must be adhered to regardless of turbulence, gusts or when trading speed for altitude.

Aircraft performance and the ability to out climb obstacles and terrain is directly related to the excess power available to the aircraft. When airspeed is reduced, so is the available lift. Providing a suitable safe margin above the minimum control speeds stated above ensures that sufficient performance margin is available to clear obstacles or terrain under both normal and OEI conditions.

evidence

The aircraft operator must document in the Operations Manual the minimum speeds applicable to the varying aircraft in the fleet with the appropriate survey equipment installed. The Operations Manual should be checked during the BARS audit to ensure that the required speeds have been nominated.

30.4: Survey Speed – Rotary Wing

FLT 7.05.06

With the exception of takeoff and landings, helicopters must minimize flight inside the avoid curve of the published height velocity diagram, or below single-engine fly-away speed for multi-engine helicopters. Where operations in this flight regime are unavoidable due to the type of survey and equipment, conduct a risk assessment including an assessment of the terrain.

Operations inside the avoid curve provide no guarantee of a safe outcome in the event of an engine failure. Time in this region should be minimized to provide minimum exposure time to an adverse outcome. Where the drag coefficient provided by the survey equipment means that extended operations in the avoid area are necessary, conduct a risk assessment to determine if the risk is acceptable to both the company and the aircraft operator.

evidence

The accompanying risk assessment should document the avoid area and the mitigating factors taken into consideration. The risk assessment should be available for review by the Competent Aviation Specialist as part of the pre-survey review process.

30.5: Turning Radius

FLT 7.05.07

Limit turns at low-level to a maximum angle of bank of 30 degrees and conduct them at a constant altitude. If the aircraft must climb due to the surrounding terrain, it should climb to the required height prior to commencing the turn. Descent back to survey height must only occur after wings level attitude is established.

Surveys are typically flown as a series of parallel lines with a 180-degree turn to reposition the aircraft in preparation for commencement of the next line. To avoid excessive bank angles and subsequent loss of lift at low level, bank should be limited to 30 degrees. If the terrain requires an increase in height, the aircraft should be climbed to the required height prior to commencement of the turn.

evidence

The aircraft operator must document in the Operations Manual the maximum 30 degree bank angle applicable during survey operations. The Operations Manual must also specify the need to climb to a constant height above terrain/obstacles before commencing the turn to the new line.

30.6: Night Instrument Flight Rules (IFR)

All night surveys must be conducted in accordance with all night, IFR requirements detailed in the BAR Standard.

Night surveys by their very nature are a higher risk proposition that day surveys. They must always be flow at or above the applicable safety altitude and follow full IFR requirements.

evidence

The aircraft operator must document in the Operations Manual the minimum altitudes applicable to night survey operations and that the conduct of such flights must be in accordance with full IFR procedures.

30.7: Minimum Temperature

The minimum ground temperature for operations must be –35 Degrees Celsius. FLT 7.05.08

Long term exposure to extreme cold conditions produces an equivalent response to fatigue in the human being. In order to prevent the onset of fatigue like symptoms, ground temperature limits of –35 degrees C must be applied.

evidence

The aircraft operator must document in the Operations Manual a minimum ground temperature of –35 degrees C.

30.8: Monitoring Radios

Turn on radios during survey flights and select the appropriate ATC or area frequencies. FLT 7.05.09

Monitoring of the correct ATC or area frequency will permit the flight crew to gain early awareness of other traffic in the area as well as keeping track of SAR requirements.

evidence

The aircraft operator must document in the Operations Manual a requirement that radios must be turned on and selected to the applicable ATC or area frequency during the conduct of survey operations.

30.9: Offshore Surveys

Offshore surveys, where the majority of the survey is over water, require additional controls. Include the following: FLT 7.02.03 FLT 7.05.10

- ***HUET training for all crew in the preceding four years;***
- ***Ten hours of initial offshore survey training with a pilot who has at least 100 hours offshore survey experience;***
- ***Five hours offshore survey time in the last 90 days, or flight check in lieu;***
- ***Basic Instrument Flight techniques including Unusual Attitude recovery training;***
- ***Minimum weather conditions of 5nm visibility and 1,000 feet ceiling;***
- ***Additional risk assessment; and***
- ***Satellite flight following with a minimum two minute reporting interval.***

Offshore surveys are a higher risk proposition in a number of areas than over land surveys. Surface glare, the lack of depth perception and lack of visual features can make height control particularly challenging and the lack of change to the visual field can be monotonous, particularly on long legs. These factors make a combination of VFR flight and IFR techniques a probable outcome in many offshore surveys.

evidence

The aircraft operator must document in the Operations Manual the minimum requirements stated above to ensure that the risk to safe operations is minimized. A review of pilot qualifications prior to the commencement of the survey should confirm that the selected crew meet the minimum requirements.

30.10: Performance Monitoring

FLT 7.05.13

Performance parameters including aircraft speed, height above terrain and drape must be periodically reviewed using data collected during the survey. Inspect deviations below minimum survey speed and minimum height. Take corrective actions to ensure deviations cease and the minimum safety margins are maintained. Determine the frequency of performance parameter reviews during the pre-start risk assessment.

A post flight review of flight performance will quickly and clearly identify whether the minimum survey parameters are being complied with. Specifically, minimum heights and speeds should be examined. The Performance Monitoring is a similar philosophy to the Flight Data Monitoring programs run on airline fleets and it should be seen as a safety improvement opportunity, not a reason to criticize a pilot or their flying skills.

Post flight review reports should be available for inspection to confirm that minimum survey parameters are being complied with.

31.0: Fatigue

Fatigued flight crew make a poor decision in the high workload environment of low-level survey operations and this results in an aircraft accident

31.1: Single-pilot Flight Time

In addition to BARS Control 1.8 and 1.9 (Flight and Duty Limits), limit single-pilot operations to five hours per day on actual survey (transit time excluded). FLT 1.04.05

Survey flight operations are more fatiguing than normal flight operations due to the high levels of concentration required at all stages of flight. The higher levels of concentration are necessary due to the low heights being flown, the presence of obstacles and the very precise tracking requirements.

Compliance with the survey flight and duty times will minimize the possibility of fatigue onset.

Resource sector aviation operations may result in-flight crew conducting tours of duty rotational in nature and extended in duration. In such circumstances, any flying undertaken during the break time away from the touring location must be recorded and the aircraft operator must be notified.

evidence

Details of the aircraft operator's fatigue management program should be published in the Operations Manual and be either specifically approved by the responsible regulatory authority, or be in compliance with that authority's fatigue management regulations. The documented program should cover daily, weekly, monthly and annual flight time limits.

The aircraft operator should include details in their Operations Manual of the system to be used for recording and tracking flight and duty times as well as rest periods. While manual, paper based systems are acceptable, computer programs that comprehensively track the varying limits and predict exceedances are the preferred option.

Flight and duty time records must confirm compliance with all requirements of the flight time limits that are applicable the aircraft operator's flight time management program. The flight and duty time records that are maintained should be consistent with information provided in other documents such as aircraft flight records.

31.2: Single-pilot Duties

The duties of the single-pilot must not be increased because of the absence of an on-board operator.

All survey operations are high-workload events. In order to share the workload, two crew operations should be the norm. Where single-pilot operations are necessary for payload/performance or due to system design, the risk assessment must consider all facets of the operation that affect crew performance to ensure that the additional workload for single-pilot duties does not increase the risk to an unacceptable level.

The aircraft operator should document the risk assessment and the factors taken into consideration.

31.3: Two-pilot Flight Time

FLT 1.04.05

In addition to BARS Control 1.8 and 1.9 (Flight and Duty Limits), limit two-pilot operations to eight hours per day on actual survey (transit time excluded).

Survey flight operations are more fatiguing than normal flight operations due to the high levels of concentration required at all stages of flight. The higher levels of concentration are necessary due to the low heights being flown, the presence of obstacles and the very precise tracking requirements.

Compliance with the survey flight and duty times will minimize the possibility of fatigue onset.

Resource sector aviation operations may result in-flight crew conducting tours of duty rotational in nature and extended in duration. In such circumstances, any flying undertaken during the break time away from the touring location must be recorded and the aircraft operator must be notified.

Details of the aircraft operator's fatigue management program should be published in the Operations Manual and be either specifically approved by the responsible regulatory authority, or be in compliance with that authority's fatigue management regulations. The documented program should cover daily, weekly, monthly and annual flight time limits.

The aircraft operator should include details in their Operations Manual of the system to be used for recording and tracking flight and duty times as well as rest periods. While manual, paper based systems are acceptable, computer programs that comprehensively track the varying limits and predict exceedances are the preferred option.

Flight and duty time records must confirm compliance with all requirements of the flight time limits that are applicable the aircraft operator's flight time management program. The flight and duty time records that are maintained should be consistent with information provided in other documents such as aircraft flight records.

31.4: Fatigue Management Considerations

Include fatigue management in the pre-start risk assessment to ensure appropriate mitigation has been planned for. Consider the following localized influences:

- ***Crew rotation;***
- ***Time zone changes during rotation travel;***
- ***Extreme climate;***
- ***Effect of altitude;***
- ***Camp conditions; and***
- ***Rest facilities.***

The pre-start risk assessment must consider all of the above elements in order to fully understand the factors that affect crew fatigue.

evidence

A copy of the risk assessment should be made available for review prior to commencement of the survey operation.

31.5: Accommodation

Appropriate accommodation, including non-share single rooms when possible, must be included during the pre-start risk assessment that covers fatigue management. The risk assessment must cover the ability of flight crew to gain uninterrupted rest when temperature, noise, darkness and any other applicable local conditions are considered.

The standard of accommodation has a direct bearing on the ability to rest well. Poor accommodation standards, including twin share and non-temperature controlled, noisy or poorly curtained rooms are a direct influence on the ability to achieve suitable rest.

evidence

The accommodation standard should be considered during the pre-start risk assessment and if deemed necessary, subject to inspection. Where the selected accommodation does not provide the necessary rest facilities, alternative accommodation should be sourced.

32.0: Defences

Mitigating defences in the event of an accident during survey operations

32.1: Satellite Flight Following

FLT 1.12.05

All survey aircraft must be tracked during survey using a satellite-based tracking system set at two minute reporting intervals and which is continuously monitored on the ground. Voice communications equipment must be available as back-up. If the satellite tracking system fails, an alternate means of flight following must be established that is acceptable to the aircraft operator and the company.

Satellite flight following equipment provides three dimensional coordinates of appropriately equipped aircraft to authorized ground stations via an associated satellite network. Aircraft GPS position information is transmitted to the satellite network and relayed to ground stations where this information is represented real-time on an internet-based graphical map showing the speed, altitude, direction and position of aircraft.

Satellite flight following significantly reduces the time required to locate an aircraft and respond to an emergency situation, in turn maximizing the chances of survival where aircraft operations are conducted in hostile environments.

evidence

Where an aircraft operator has aircraft fitted with a satellite flight following system, the operator should provide documented procedures for the system to be monitored by designated flight following personnel, with no secondary duties, who if required, are authorized and able to initiate the Emergency Response Plan.

The aircraft operator's Operations Manual (or equivalent document) should contain job descriptions that include the roles and responsibilities for these positions and the training requirements for persons appointed to these positions. It should also contain the process by which their ongoing competencies are assured. The documented training requirements should adequately address management of the flight following function in both normal and emergency operations. Where personnel associated with flight following are to utilize radio communications equipment that transmits over the aeronautical radio communication network, documented requirements must detail the training and licensing that applies.

32.2: Local Flight Following

FLT 1.12.06

The aircraft operator must implement a flight following system for all survey flights that includes scheduled position reports, position logs maintained on the ground, operational flight plans and overdue/emergency response procedures.

Flight following is normally a service provided by national air traffic control services which focuses on providing information about passing and surrounding traffic. An added benefit of the services provided is the monitoring of an aircraft's normal operations and the ability to initiate response actions in emergencies.

In situations where flights are authorized to be conducted without flight following being provided by ATC, the aircraft operator must ensure that a system is in place for all such flights. The system must closely monitor the safety and progress of flights and initiate the ERP in the event of an emergency situation developing or communications being lost.

evidence

Where an aircraft operator conducts flights outside of controlled airspace or in locations where they are not subject to any form of position reporting, the operator should provide documented procedures that allow for such flights to be monitored by designated flight following personnel. Persons who are responsible for flight following will be tasked with no secondary duties and must be authorized, if required, to initiate the ERP and notify relevant SAR authorities.

The aircraft operator's OM (or equivalent document) should contain job descriptions that detail the roles and responsibilities for these positions along and the training requirements for persons appointed to these positions. It should also contain the process by which their ongoing competencies are assured. Where personnel associated with flight following are to utilize radio communications equipment that transmits over the aeronautical radio communication network, documented requirements must detail the training and licensing that applies.

The aircraft operator's documented SOPs provides for equipment requirements and procedures that will ensure that constant radio contact can be maintained and that routine position and altitude reporting occurs at intervals of 15 minutes, but not exceeding 30 minutes.

32.3: Emergency Response Procedures

Emergency Response Procedures must be developed for each survey and be included as part of the pre-start operational risk assessment.

Aviation accidents/significant incidents are rare events and despite the importance of implementing immediate and positive action, evidence shows that very few organizations are prepared when such an event occurs. Initiation of timely and appropriate action is extremely critical in situations where delays or the implementation of incorrect actions may affect the chances of someone's survival.

People who have been involved in the immediate response to an aircraft accident will readily agree that during the first few minutes (and maybe hours) events can be confusing and chaotic. How an organization performs in the aftermath of an accident or other emergency can depend on how well it handles the immediate response during that time immediately following a major safety event.

Successful response to an emergency begins with effective planning. Both the company and aircraft operator should develop documented ERP detailing what should be done after an accident and who is responsible for completion of each action. The ERP provides the basis for adopting a systematic approach to managing the organization's affairs and operations following a significant and unplanned event and should be practiced and reviewed regularly.

The aircraft operator must document an ERP to provide instructions and guidance on the duties and obligations of personnel following an accident or significant incident.

The company must document an ERP for each airfield they operate. An airfield ERP must be appropriate to the aircraft operations and other activities conducted at that location and should provide for the coordination of actions to be taken in an emergency at the airfield or in its vicinity.

An ERP appropriate to the size, nature and complexity of the operations being undertaken should be documented and available.

The ERP should adequately detail and provide for:

- A responsible and qualified person to lead the emergency response;
- The duties and responsibilities of key personnel in an emergency;
- Contact details for all relevant organizations and individuals including local search and rescue (SAR) capabilities;
- Effective communication between the aircraft operator, company and SAR resources;
- A process for periodically checking and updating emergency contact lists; and
- Conducting periodic, scheduled emergency response drills, exercises and/or tests (if the aircraft operator conducts offshore operations, it should ensure emergency response drills include worst-case scenarios involving considerations such as last-light, significant weather and the time taken to search for missing aircraft).

The documented ERPs for both the company and aircraft operator should provide guidance to both organizations in pre-planning for emergencies, as well as detailing the protocols that will ensure appropriate coordination between the company and aircraft operator and other affected agencies.

32.4: Flight Crew Clothing

All crew must wear appropriate clothing for survey operations including:

- ***Non-synthetic long trousers and long sleeved shirt or appropriate flying suit;***
- ***Cotton undergarments;***
- ***Robust, enclosed shoes; and***
- ***Access to felt lined parka, hood and mittens (for cold weather operations).***

Appropriate clothing will minimize the risk of injury from fire and maximize survival opportunities.

While the level of comfort is a consideration for flight crew during survey operations, what is being worn on a flight can significantly affect the chances of surviving an emergency where the aircraft may be required to make an emergency landing.

To maximize the chances of surviving an emergency landing, survey crew must be required to wear clothing and footwear appropriate to the environment being flown over, based on a risk assessment. At a minimum, the above items must be worn.

evidence

The aircraft operator's Operations Manual should specify the minimum clothing standard and the start-up Operational Review should verify that the appropriate clothing standard is in place.

32.5: Crew Helmets

FLT 7.05.11

When routinely operating below 500 feet above ground level flying helmets manufactured to appropriate industry standards must be worn by all crew members (unless a risk assessment states otherwise).

Helmets provide protection to the head and assist in combatting two different types of emergency; protection from a penetrating birdstrike and protection during a crash event. Helmets should be industry standard, equipped with a visor(s) and provide support for radio telecommunications equipment.

evidence

The aircraft operator's Operations Manual should specify the minimum helmet standard and the start-up Operational Review should verify that the flight crew are wearing as appropriate standard of helmet.

32.6: Survival Pack

MNT 7.04.09

Carry a survival pack for all survey flights which is suited to the operating environment and includes a means to start a fire, a knife and a signaling mirror.

The ability for a search and rescue response will vary, and will always be affected by variables such as weather, availability of resources and time of day. Because of this every flight should be considered as a potential survival situation requiring survival equipment appropriate to the location and climate.

evidence

The aircraft operator will have a documented procedure specifying what requirements are to be contained in a survival kit if requested by the BMO or when required by the responsible regulatory authority. Where a survival kit is not routinely carried on an aircraft, the aircraft operator should have a documented procedure to be followed in circumstances where the fitment of survival kits is required. The condition and content of a survival kit should either form part of the System of Maintenance or be tracked and inspected using an equivalent process.

The content of the survival kit should be described in the aircraft operator's documentation and must be applicable to both the seating capacity of the aircraft to which it is fitted and the geographic and/or hostile environment where operations are to be undertaken.

32.7: Life Jackets

FLT 7.05.12

Life jackets must be worn by all crew members if the survey is being conducted beyond autorotative or gliding distance from land.

Life jackets are an essential survival tool in any ditching scenario. Life jackets come in many sizes, shapes and standards and it is important that life jackets of an appropriate standard, manufactured to meet strict TSO requirements are in use.

Crotch straps prevent the life jacket from riding up over the survivors in the water, thereby reducing the risks of fatigue and/or drowning and are therefore a minimum requirement.

Spray hoods are a requirement as they provide an effective method of preventing progressive drowning from wind induced spray and waves relentlessly pounding a survivor’s face.

Other items that should be carried on life jackets include:

- A life line to enable survivors to tie themselves together;
- A light to attract attention, preferably a strobe light;
- A whistle to enable survivors to locate each other;
- A grab handle to enable rescuers to more easily bring survivors into a rescue craft; and
- Reflective tape to improve visibility to rescuers at night.

Crew members’ life jackets should also include a PLB with a voice capability and day/night flares.

evidence

Aircraft operators must provide an appropriate standard of life jacket. Crew training, operating procedures and the System of Maintenance should all reflect employment of this capability.

Aircraft operator reviews should confirm that the life jackets are provided and that they are well identified and included on the passenger briefing video/brief and the passenger safety cards.

32.8: Liferafts

MNT 7.04.08

Provide dual chamber, reversible, liferafts for all crew members if the survey is being conducted beyond autorotative or gliding distance from land. Liferafts with a canopy and inflatable floor are preferred.

A ditching scenario ideally allows the occupants to be able to enter liferafts whilst the aircraft is still afloat. Once all occupants are aboard, the tethers should be cut with the special knives provided in the raft kits and the liferafts moved away from the aircraft in case it sinks. The tether should incorporate a “weak link” so that if the aircraft does sink before the tethers are cut, the liferafts can disengage and not be dragged down with it.

Acceptable liferafts should be self-righting (always floating correct side up) or reversible (either side is acceptable when first entering). Either liferaft type will avoid the problems of survivors unsuccessfully attempting to flip a liferaft in high sea states or high wind conditions.

Offshore survival kits including signaling devices should be carried in the liferafts and are typically tethered to the liferaft by a lanyard.

evidence

Each aircraft used offshore should have a clearly marked location for storage of the liferafts that complies with standard restraint criteria.

Liferafts will have raft equipment and survival kits, with contents approved by an aviation specialist.

32.9: Underwater Escape Training

For both fixed wing and helicopter surveys over water, all crew members must undergo underwater escape training that includes use of a Modular Egress Training Simulator (METS) within the previous four years (unless local regulation requires greater frequency). FLT 7.02.02

Having the knowledge and skills necessary to assist with survival in a ditching scenario, significantly increases the chances of surviving such an emergency situation. Underwater escape training courses will increase an individual's knowledge of safety procedures and ability to successfully exit an actual ditching involving a submerged aircraft or helicopter.

The ability of a METS trainer to submerge, and then roll inverted, provides a very realistic training environment and is the minimum standard considered acceptable for offshore operations.

Underwater escape training should be representative of the escape paths and exit types for the aircraft or helicopter model being flown. Underwater escape training facilities that can replicate spray/wave and day/night conditions are preferred.

The company and aircraft operator must have documented policies that require all flight crew involved in offshore operations to undertake an accepted underwater escape training course. This must be an element of their initial training for offshore surveys and be repeated every four years (or more frequently if required by the responsible regulatory authority).

evidence

Associated training records must confirm that the documented requirements, processes and procedures associated with the company's and aircraft operator's Underwater escape training program are being complied with consistently in initial training and on a routine basis. Personnel files and rostering records confirm appropriate implementation of training programs.

The aircraft operator should have a process to confirm current underwater escape training credentials prior to assignment to an offshore survey role.

32.10: Flight Crew PLB

FLT 7.05.14

Flight crew operating in a hostile environment must carry voice-capable GPS Personal Locator Beacon (PLB) and any other necessary survival equipment on their person.

The requirement for survey flight crew to carry a voice-capable PLB as mitigation addresses several lessons learned from resource sector accidents:

- Back-up source of location in the event the ELT does not activate;
- The ability to communicate to searching aircraft to assist in locating survivors. This is particularly important in a jungle environment where the overhead canopy may prevent the searching aircraft from visually identifying the survivors below; and
- The ability to communicate the condition of the survivors to the searching aircraft, and whether there is a requirement to winch the critically injured out prior to last light before a ground party can reach the accident scene.

The requirement to have the PLB carried on the person is to maximize the opportunity of its use in any accident scenario. Where the aircraft operator elects to carry voice-capable PLBs in the cockpit, but not as part of a flight crew survival vest, a risk-based discussion demonstrating an equivalent level of capability should be documented and available to the company.

evidence

Where an aircraft operator undertakes helicopter operations in hostile environments, the Operations Manual should contain requirements for flight crew to carry a voice-capable, GPS PLB on their person.

Maintenance records should detail the completion of serviceability testing and maintenance procedures of beacons fitted to survival vests.

The aircraft operator should maintain registration documents for each beacon that show that appropriate identification and contact details are up to date and correct.

C FLIGHT CREW COMPETENCY BASED TRAINING FRAMEWORK

The purpose of this section is to provide a framework for competency based training that can be used in lieu of mandating a minimum number of flying hours. The framework must be presented in a format that is clear, objective and easily auditable that will in turn provide the necessary assurance for client companies.

Prescriptive stipulation of minimum hour requirements for flight crew has been a common practice used by clients and insurers alike in the aviation industry as a measure of flight crew competence. The underlying assumption being flight time experience accrued equated to a commensurate level of competence. Unfortunately this approach does not recognize quality of flight time, knowledge and practical experience gained by the flight crew member in their individual circumstances. Simply put, the blind spot in focusing on prescriptive minimum hours is that the type and quality of flying hour is not considered. An individual who has logged thousands of hours in one location, on one aircraft type and in the same role is not automatically a 'better pilot' when compared to an individual with the half the flight time, but with rich and varied flight operations experience across a variety of aircraft types, roles and responsibilities.

One of the ongoing difficulties facing aircraft operators today is being able to recruit and progress qualified flight crew members through to command positions in a planned and structured manner. This is particularly true where client companies or insurers set industry accepted minimum experience criteria that do not provide adequate opportunity for career progression from co-pilot to Captain. In periods of airline expansion the charter operators who provide the pool of eligible recruits are quite often forced to fill the void with flight crew who meet the minimum hour requirements on paper rather than focus on individuals who have demonstrated the appropriate levels of competency for promotion.

While some regulatory bodies and the airlines industry in general have developed and implemented a competency based training system, the same cannot be said for the sector focused on providing support to the charter industry.

C1: Competency Based Training (CBT)

An industry accepted CBT program will remove prescriptive stipulation of minimum number of hours and replace it with a structured approach designed to develop and progress individual flight crew members primarily based on competency. Based on historical experience, there will still necessarily need to be some form of measure of time-related experience both for entry into and exit from a CBT program. However, an added focus on competency provides the mechanism to move beyond a one-dimensional approach of simply looking at flying hours alone. An acceptable CBT program must be systematic in its approach with evidence of:

- Training for a licence, rating or endorsement conducted to approved standards;
- A training program that is clearly documented in a logical, effective and relevant manner;
- All results correctly and comprehensively recorded;
- Assessments that are rigorous, standardized and measured against approved standards;
- Training that is validated by summative tests.

C2: Eight Elements of CBT Framework

An approved CBT framework must, at a minimum, comprise of 8 key elements that each are clearly identified, documented and able to be sampled during an audit process. These elements are:

C2.1: Selection Process

The aircraft operator's CBT System shall have a documented selection process for all flight crew that involves representatives from both the Training Department and Flight Operations and their documented sign-off and approval. The selection process will include the Head of Check and Training (HOCT) and the Chief Pilot, or their nominated delegates and should incorporate some form of simulator evaluation. Selected candidates for the CBT program will meet or exceed the following requirements:

- Class 1 Medical;
- 1500 hours total time;
- 500 hours multi-engine time;
- 100 hours Command time;
- Commercial Aeroplane Licence; and
- Multi-Engine Instrument Rating.

Accepting candidates that do not meet the aforementioned requirements can be accommodated but must be on the basis of a pre-CBT simulator session assessed as meeting an acceptable standard. The focus of the assessment should be on whether the candidate possesses necessary flying skills and learning aptitude for CBT program entry. Such an assessment should include progressively more involved sequences to be flown rather than a straightforward assessment of instrument approach flying skills.

C2.2: Flight Crew Category System

The aircraft operator will have a Category system (or similar) that provides the framework for flight crew progression. Paragraph C4: CBT Program Overview outlines suggested minimum requirements for such a system. In assessing the competencies the focus should be on achieving the published syllabus requirements to a satisfactory standard, not just on accruing hours on type. Consequently the required competencies may be achieved in less than prescriptive hour requirements if only short sectors are flown (e.g. short haul vs long haul operations) allowing an individual greater opportunity and exposure to the skills required for progression. The structure of the CBT program should recognize this if appropriate for the route structure being flown.

A key component of any CBT system is in the successful attainment of competencies associated with instrument flying, and all supporting modes of automation. It is expected that any candidate for a CBT program will already hold a Multi-Engine Instrument Rating as it is a core competency requirement for the role. However, the focus of the CBT is not on just simply 'box ticking' specific instrument approaches to a required standard, it is on the employment of instrument flying skills throughout the range of operational scenarios, both normal and abnormal, that the flight crew member is likely to face in the operational environment.

C2.3: Assessment for Progression

The aircraft operator will have a Training and Checking Manual that will include the following documented requirements:

- A syllabus that reflects each stage along with aim, objective and outcomes for each training element;
- Minimum competencies required for each level of progression;
- Ground school training programs and examination requirements;
- Airborne training programs and examination requirements;
- Simulator training programs and examination requirements;
- Category Upgrade checking forms;
- Proficiency Check and Line Check forms; and
- Competencies, training and standardization requirements for Training and Checking staff.

Each candidate undergoing progression using a CBT system will have a comprehensive training file, identifying each stage of progression with all the necessary endorsements and approvals from the HOCT and the Chief Pilot. The training file forms one key component of the audit trail for the CBT program.

C2.4: Use of Simulators

Use of a regulatory approved full motion simulator is a minimum mandatory requirement for the conduct of a CBT program. While a type-specific full motion flight simulator provides the required level of realism and therefore the most realistic training, other flight training devices may be used to supplement the training where appropriate (e.g. computer based training for familiarization with the Flight Management System).

The following minimum requirements must be in place to support a CBT program:

- Line Oriented Flight Training (LOFT) and Crew Resource Management (CRM) developed by and/or endorsed by the aircraft operator must form part of the syllabus;
- CRM is to be assessed during all simulator training sessions;
- Aircraft operator's own Simulator Flying Instructors/Examiners (SFI/SFEs) are to be used for both LOFT exercises and during any assessments for category upgrade; and
- Localized experience and evidence-based scenarios are to be considered for development of LOFT exercises.

C2.5: Training and Checking Manual Inclusions

The aircraft operator's Training and Checking Manual will include a description and aims of the CBT program including means by which aircraft operator Type Rating Instructor (TRI) or Type Rating Examiner (TRE) standardization is achieved.

In addition to the use of simulation, thorough and documented Line and Proficiency Checks must be conducted and the candidate assessed for continued progression on each training element. A panel comprising at least one TRI/TRE and Chief Pilot (or delegate) must jointly approve each stage of progression.

Training and recommendations for advancement will only be conducted by TRI/TREs as delegated by the National Aviation Authority in their Instrument of Approval and Delegation. Line Training may also be conducted by Line Training Captains (LTC) nominated by the HOCT in accordance with the requirements specified in the Training and Checking Manual.

C2.6: Instrument and Night Flying

A core focus on instrument flying skills must be established and maintained throughout the entire CBT program. The CBT must place an emphasis on instrument and night operations being treated as one and the same. Instrument flying skills are critical for all operations, and the CBT design will include a need for high levels of proficiency with the aircraft type's automation and backup modes of aircraft operation. The aptitude and ability of a candidate's ability to fly under the Instrument Flight Rules for day/night and manage all modes of automation in normal and abnormal operations must be clearly documented with relevant endorsements and approvals throughout progression towards Command.

C2.7: Lateral Recruitment

Circumstances will commonly arise when the experience level of an applicant exceeds the entry-level requirements as outlined in 4.1. For example:

- A piston engine pilot may have substantial multi-engine, multi-crew experience, but no turbine time or operational IFR experience;
- A pilot may have substantial Flight Management System (FMS) experience but no time on type; or
- A type rated an experienced captain without any recent experience.

Such cases require development of tailored CBT program that suit the individual's circumstances, while still meeting the intent of the category system.

The process by which an aircraft operator assesses the prior experience and develops specific programs must be documented and provide consistent guidance that supports shortening the category framework.

C2.8: Command Upgrade

At the culmination of the program, the Command Upgrade check must incorporate the following elements:

- Ground training that addresses:
  - the technical aspects of the aircraft;
  - aviation law and command authority;
  - crew and passenger management;
  - airmanship;
  - situational awareness;
  - commercial and client specific requirements; and
  - all qualities that combine to make a good Aircraft Captain.
- A Proficiency Check (conducted in the simulator) with a focus on in-flight emergency management of the aircraft; and
- A series of Line Checks (conducted in the aircraft) associated with operational management of routine flights.

C3: Conclusion

The development of an industry agreed Competency Based Training framework provides the catalyst for Operators to choose to move away from the prescriptive approach historically used to recruit and promote flight crew to command positions. The incorporation of a robust CBT program will provide transparency into the operator's training regime and allow the necessary auditable assurance demanded by all clients of the industry.

Pilot Category	Overview	Suggested Training Requirements and Outcomes	
E	Entry phase. The candidate is not yet type rated and may not necessarily have multi-crew or practical IFR experience.	1. Completed pre-CBT simulator evaluation. 2. Technical Ground School. 3. All aircraft systems and flying training are to be conducted on either the aircraft, or combination of aircraft and simulator. 4. Instrument rating conducted on type. 5. CRM training. 6. Emergency Procedures training (including oxygen use, emergency and life-saving equipment, evacuation procedures, aircraft and passenger control/safety briefing and security training). 7. Operator Proficiency Check: clearance to progress to Cat D.	
D	Line training phase commences.	1. Line operations. Exposure to a representative sample of routes and instrument approaches as both Pilot Flying (PF) and Pilot Not Flying (PNF). Shall include night flying. 2. Discussions with LTC to include abnormal and emergency operations and performance related issues. 3. Line Check: clearance to progress to Cat C.	

	Suggested Duration	Competencies
	1. Defined sequences with simplified aircraft configurations and power settings. 2. Technical ground school program (includes FMS training if applicable) + initial flying training with TRI/TRE, including initial aircraft endorsement. Technical, operational, Flight Manual review, Operations Manual review, Dangerous Goods awareness. 3. Approximately 35 hours instrument time with TRI/TRE (may all be in simulator). Defined training syllabus – normally seven to eight simulator sessions of four hours plus final assessment. 4. Conducted in the simulator 5. CRM 6. Emergency Procedures 7. Minimum of two hours, with TRI/TRE. May be conducted in simulator.	Candidate must hold as a minimum: a CPL (A) licence with 1500 hours total time, 500 multi-engine hours, 100 hours command time and ATPL theory at commencement. On completion, the candidate will have a type rating and Instrument rating, together with any additional legislative or contractual requirements.
	1. Focus on routine operations including exposure to a representative sample of routes and instrument approaches from co-pilot seat. A minimum of three of each type of instrument approach shall be flow as both PF and PNF. Minimum of 20 sectors with LTC. A sector shall be regarded as a flight between the departure and destination airfields, where all normal checklists are employed. 2. Normally conducted in cruise flight, but may be accomplished 1:1 with trainee and LTC in classroom environment. 3. With TRI/TRE. Four sectors, involving both administrative and flying duties as PF and PNF.	Consistent, safe handling. Cleared to line as a competent co-pilot.

Pilot Category	Overview	Suggested Training Requirements and Outcomes	
C	Supervised consolidation flying.	1. Supervised line flying. 2. Line Check: clearance to progress to Cat B.	
B	Co-pilot line flying phase.	1. Line flying with indirect supervision. 2. Will include 6 months simulator Proficiency Check. 3. Category A Upgrade Check: clearance to progress to ICUS phase.	
A	Command Endorsement phase.	1. Command Upgrade course consisting of the following minimum elements: Legal aspects of Command, Regulatory Requirements, Aircraft Performance, Supervision of crew (on and off duty), Technical Ground School refresher, Command CRM, Leadership and Interpersonal Skills required for command, Effective communication, Supervision of flying by First Officers and Effective decision making. 2. LHS flying in simulator. All sessions with designated ICUS training captain. 3. Command upgrade assessment: clearance to progress to command phase.	
Command Upgrade	Command upgrade phase.	Command Upgrade. Suggested requirements: 1. Not less than 50 sectors on type. 2. Minimum of 40 hours of ICUS line flying. 3. Line check (aircraft).	

	Suggested Duration	Competencies
	1. Right hand seat flying only with LTC to syllabus defined minimum criteria. Must cover all normal, abnormal and emergency considerations and include client specific requirements. Recommended minimum time 200 hours. 2. With TRI/TRE. 4 sectors, involving both administrative and flying duties as PF and PNF.	Perform co-pilot duties with minimal supervision. Sound application and understanding of all normal and emergency operations.
	1. 500 hours or six months on type (assumes flight hours accrued at 1,000 hours per annum): may be crewed with line captains. During this phase, the line captain is to possess at least 500 in command on the aircraft type. 2. 2 x 4 hour simulator sessions covering training elements and the equivalent of IRR. Conducted by TRI/TRE. 3. With TRI/TRE. Will include both line and simulator flying.	Consistent, safe handling in all operational conditions. High level of theoretical and technical knowledge. Manages complex emergencies. Employs CRM skillset throughout.
	1. Conducted by Head of Check and Training or delegate. 2. Minimum of 5 x 4 hour sessions covering all aspects of aircraft operation in normal and emergency operations. 3. With TRI/TRE: conducted in a simulator.	Candidate must possess ATPL (A) theory subjects. Command standard in normal and emergency theory, skill and multi-crew procedures.
	1. Time must be accrued in aircraft. May consist of time as co-pilot and ICUS. 2. Flown with ICUS training captain as both PF and PNF. Must include consideration of co-pilot supervision throughout the range of flight operations. 3. Line check with TRE.	Command standard in normal and emergency theory, skill and multi-crew procedures. Successfully completed all Training and Checking Manual competencies. Completed all instrument rating requirements, including recency, to command standard.

D SHORT-TERM OR EMERGENCY-USE AIRSTRIP OPERATIONS

Aerodrome requirements outlined in the BAR Standard are considered appropriate for long-term (greater than six months) facilities owned and/or operated by companies and are associated with production operations

This section is aimed at addressing short-term and emergency-use only airstrip requirements, where it is not generally practical or possible to impose the higher level of requirements that exists for regular use aerodromes. This guidance is aimed at those owned and operated airstrips supporting exploration and construction operations, or airstrips whose sole purpose is for emergency medical evacuation (medevac).

This section is provided as a minimum standard for such airstrip operations that have the following characteristics:

- Owned and/or operated by the company, supports exploration and/or short-term construction and/or emergency use;
- For use during day, visual operations for passenger, freight or aerial work;
- Night, visual operations for emergency medevac only (See Section 5.6 for lighting requirements);
- Instrument approach procedures to a landing minima for the airstrip are not available; and
- Aircraft used are limited to those less than 5,700kg maximum takeoff weight, unless reviewed as being suitable for the dimensions presented (for example King Air 350, Twin Otter, Beech 1900).

The six critical controls associated with remote airstrip operations are:

1. Design
2. Obstacle clearance
3. Siting
4. Construction
5. Operations
6. Maintenance

Where the company is utilizing a government or third-party owned strip for short-term purposes, this section is intended to provide a baseline for risk assessment purposes by the company and aircraft operator.

Companies should conduct a thorough risk assessment dedicated to the design, use and expectations of a remote airstrip supporting any resource sector activity. The assessment must involve representatives from the aircraft operator likely to use the airstrip, in addition to company and aviation specialist involvement.

The assessment should be conducted with sufficient time remaining for any actions to be incorporated prior to operational start-up and first use.

D1: Design of the Short-term Airstrip

Minimum airstrip design comprises six main elements to create a safe area for aircraft to land, takeoff, park and taxi (ground maneuver).

- Runway: the only part of the aerodrome on which aircraft can land and takeoff. It consists of a rectangle of land constructed or cleared to be a smooth, firm surface of sufficient size to accommodate an operating aircraft;
- Runway Strip: this is the area surrounding the runway that acts as a buffer zone for aircraft that may veer off the centerline, either while on the ground or in the air. The surface of the runway strip needs to be smooth and free from objects sticking into the air. The portion of the runway strip beyond the end of the runway is also commonly known as the clearway;
- Taxiway: this area provides a link between the runway and the apron. It is typically constructed or cleared in the same manner as the runway;
- Apron: this is where aircraft park to board and de-board passengers, handle baggage and freight, and for refueling. The apron is generally the same construction as the runway and taxiway, although consideration may be given to increasing the strength of parking pads due to the increased static standing loads of parked aircraft. It also needs to be big enough for the number and type of aircraft which use the airstrip;
- Wind Indicator: the wind indicator or windsock consists of a sleeve of conspicuous color attached to a pole in a manner that enables it to indicate the wind direction; and
- Signal Circle: this is a small circular area near the wind indicator that is black and marked with cones. In this area, signals to aircraft are positioned when airstrip serviceability is compromised.

Airstrip Dimensions

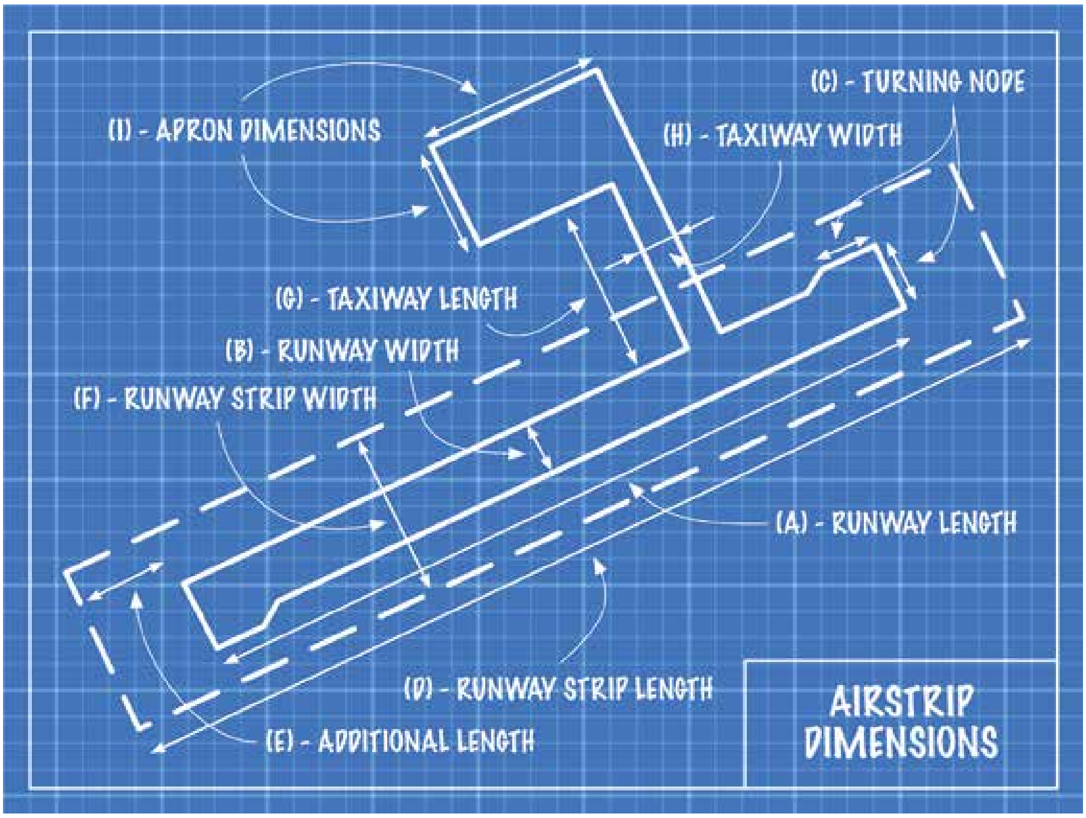


Figure 1: Geometric layout of short-term or emergency use airstrip.

The above facilities should meet standards relative to the size of the aircraft which use the airstrip. While standards vary according to different systems of categorizing aircraft (for example the ICAO code reference system), the following dimensions are offered as a guideline for aircraft operating in the ICAO Aerodrome Reference Code 2 classification (e.g. Beechcraft King Air 200, DHC-6 Twin Otter, Cessna 441 Conquest, etc).

Airstrip Facility	Dimension
Runway	
Length (m)	1,200(m)
Width (m)	23(m)
Turning Node (mxm)	25x25(mxm)
Runway Strip	
Length (m)	1,320(m)
Additional Length at each end (m)	60(m)
Width (m)	80(m)
Taxiway	
Width (m)	10.5(m)
Apron	
Size (mxm)	30x50(mxm)

Aircraft of ICAO Aerodrome Reference Code 3 (e.g. Metro 23, Jetstream 31/32, etc.) may require a larger runway to support their operations.

Companies should consult with the aircraft operator and/or aviation specialists prior to contracting a specific aircraft type or proceeding with airfield construction. This will ensure all relevant factors are considered.

D2: Obstacle Clearance

In addition to physical aspects of the airstrip, obstacle clearance requirements from the end and the sides of the airstrip should be considered during airstrip siting and be met during construction and maintenance. The prescribed areas should aim to be clear of objects that project higher than the clearance surfaces.

These clearance areas project out from each end and from the sides of the runway strip. The takeoff/approach areas (TOAA) protect the aircraft during climb-out and approach. The transitional areas protect aircraft that deviate off the runway centerline.

Takeoff/Approach Area Dimensions

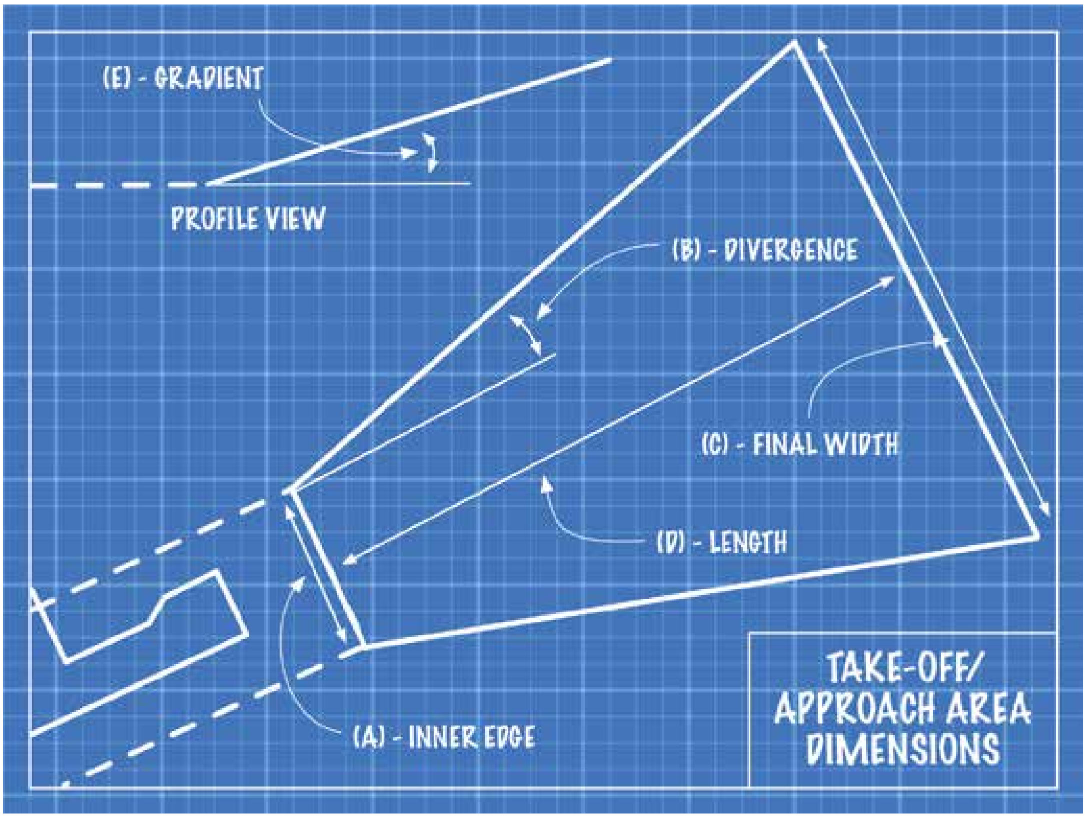


Figure 2: Takeoff/approach area (TOAA) schematic.

Transitional Area Dimensions

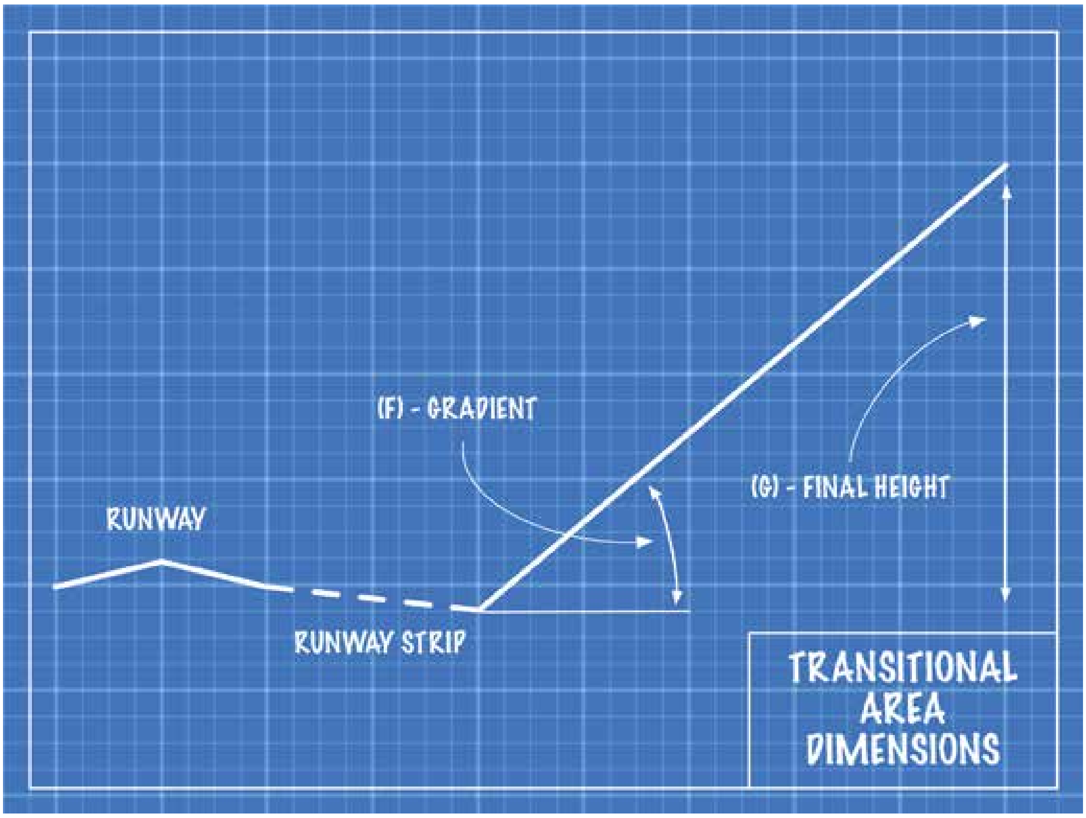


Figure 3: Transitional area schematic.

Much like the physical design standards, obstacle clearance requirements vary depending on aircraft size and performance capability. The following table sets out minimum clearance standards for the typical aircraft used:

Clearance Area	Schematic	Requirement
Takeoff/Approach Areas		
Inner Edge (m)	A	80m
Divergence (%)	B	10%
Length (m)	D	2,500m
Gradient (%)	E	4%
Transitional Areas		
Gradient (%)	F	20%
Final Height (m)	G	45m

Objects above 45m outside of these areas and within 2.5km of the airstrip also need to be identified for marking and/or lighting.

D3: Airstrip Siting

Using the above dimensions as a template, siting an airstrip must consider the following:

- Prevailing wind direction: the runway should be aligned, as much as possible, to the dominant wind direction;
- Surrounding terrain and other potential obstacles:
  - obstacle clearance requirements must be met according to the standards set out above;
  - power line and radio antenna location require special consideration;
- Surface characteristics:
  - natural surface qualities such as strength, smoothness and slope should be considered prior to construction;
  - areas with effective drainage, gentle and consistent slopes and surfaces that are capable of withstanding regular traffic should be assessed;
  - sandy and rocky surfaces as well as those surfaces that becomes slippery when wet should be avoided;
- Proximity to mining operations:
  - the airstrip should be located in a position where mining operations will not impact on aircraft safety and vice versa;
  - the takeoff and approach tracks must be clear of mining activity, with particular consideration given to any blasting activity that may produce fly rock; and
- Site access: safe and efficient access to the airstrip is critical, especially in an emergency situation.

D4: Airstrip Construction

Construction of the airstrip will involve clearing, shaping land and installing markers as a minimum standard. Optional work may include constructing a pavement and installing lights if the airstrip must be used for night medevac flights.

The construction of each area should meet the following requirements.

Runway

The runway should be cleared, made smooth and sloped to promote drainage of surface water. The objective of the runway is to consistently support aircraft movements.

A central crown is preferred although a cross-fall within the limits detailed in the table presented at the end of the section is also permitted. A cross-fall is when the slope of the runway (or road) surface falls from one side to the other rather than falling away from the center. Longitudinal slopes should also remain within these limits and abrupt changes must be minimized.

While natural surfaces can accommodate smaller aircraft, a constructed surface can improve operating condition and resistance to weather.

For dry-land-based runways, gravel pavements provide good support and should consist of a mixture of stone sizes no larger than 25mm with fines/dust such that a tightly bound surface results. Sealing the runway surface is also an option to provide wet weather capability.

For other types of runway surfaces (for example, ice or lake-bed), a suitably qualified airport engineer should be engaged to assess the natural surface and provide advice on constructed pavements.

Regardless of the final surface, the runway should be free of defects that may impact aircraft ride and controllability. Surface smoothness can be tested with a stiffly-sprung vehicle traveling at speed (approximately 70-80km/h), if the ride is comfortable, the surface is smooth enough for aircraft.

Short-term airstrip operated by resource company

Runway Strip

The runway strip should also be cleared, made smooth and sloped to provide drainage. The objective of this surface is to support aircraft in the event of it departing the runway. The aircraft should come through such an event undamaged.

The transition from the runway to the runway strip should be near seamless with a minimum drop-off from sealed runways to the runway strip. Wind-rows and subsidence should be eliminated.

The shape of the runway strip should fall away from the runway within the limits outlined below. Open drains should not be established within the runway strip and abrupt changes in slope minimized.

Taxiway

Like the runway, the taxiway is a cleared, smooth and shaped area which is clear of obstacles and capable of supporting the aircraft during taxi. Slopes should be within the limits set for runways and special consideration should be made of runway strip slopes in the vicinity of the taxiway.

Apron

Aprons are also cleared, smoothed and graded for drainage. Consider constructing an apron of a suitable size, able to support the static loads of a parked aircraft and protect propeller blades from stone damage when aircraft are stationary.

Airstrip Facility	Requirement
Runway, Taxiway and Apron	
Maximum Longitudinal Slope (%)	2%
Maximum Transverse Slope (%)	2%
Minimum Transverse Slope (%)	1%
Runway Strip	
Maximum Transverse Slope (%)	3%
Wind Indicator	
Height (m)	6.5(m)
Sleeve Length (m)	3.65(m)
Ground Circle Diameter (m)	15(m)
Signal Circle	
Ground Circle Diameter (m)	9(m)

Wind Indicator

The wind indicator consists of a conspicuous color PVC sleeve attached via hinge to a vertical pole according to the requirements below. The ground surface surrounding the pole is blackened and marked. The wind indicator must be positioned such that it is visible from the apron and runway ends.

Signal Circle

The signal circle is simply a blackened circle of the required diameter that is positioned near (and typically on the runway side of) the wind indicator.

Obstacle Clearance Areas

Trees in the designated Obstacle Clearance Areas should be cleared such that obstacle clearance requirements are maintained. The distance out from the runway strip that clearing must extend will depend on the height of the trees and whether the ground rises or falls from the runway.

Markers

All aircraft facilities must be marked in accordance with the following requirements:

If markers cannot be positioned flush with the surrounding surface, they must be constructed of frangible material and are normally cone shaped. Markers will be either white or yellow in color. Smaller cones are used on the runway and taxiway edges and larger cones on the runway strip, apron, wind indicator and signal circle. The specific dimensions are:

- Small Cones: 400mm base diameter and 300mm height; and
- Large Cones: 750mm base diameter and 500mm height.

These cones are laid out on the corners and along the edges of the airstrip's facilities as follows:

- Corners consist of an "L" pattern of five cones;
- Edges with markers spaced at 90m for runway/runway strip edges and 10m for taxiway/apron edges;
- White cones are used on the runway and strip; and
- Yellow cones are used on the taxiway and apron.

Large white cones are also placed around the wind indicator and signal circle with 15 and six cones used respectively.

Remote Airstrip Marker and Signal Specifications

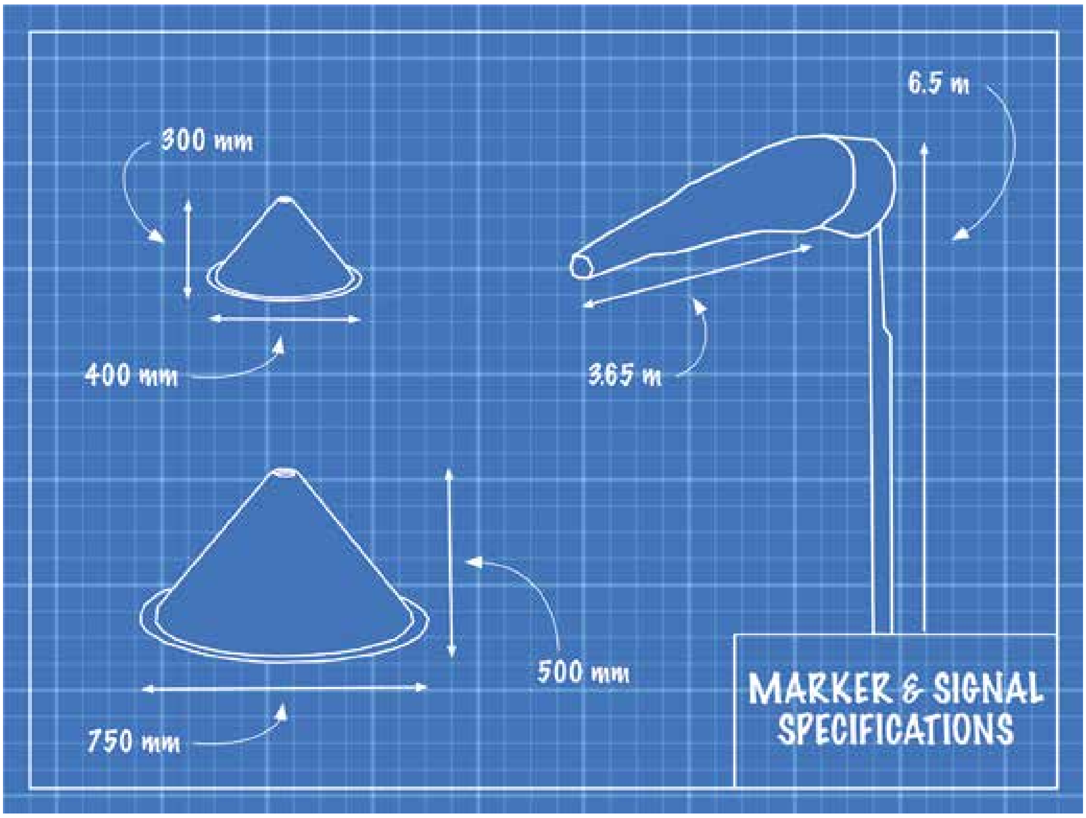


Figure 4: Marker and signal specifications.

Remote Airstrip Marker Layout

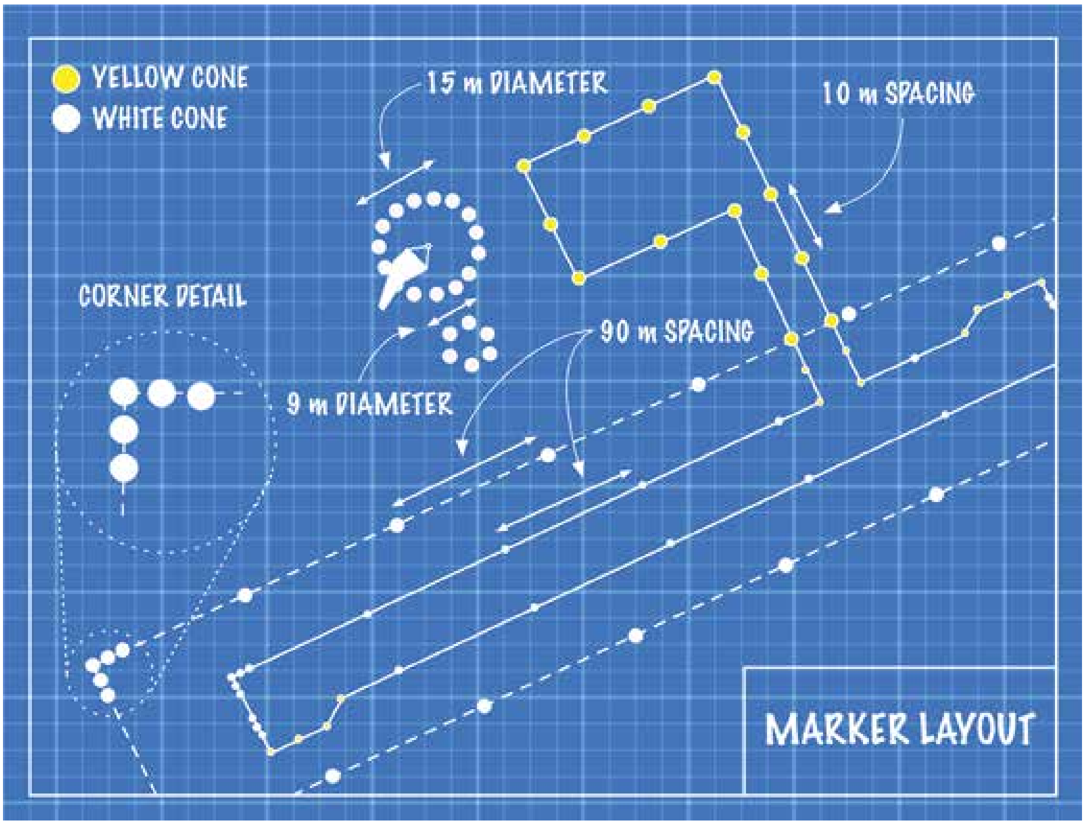


Figure 5: Marker Layout.

Lighting

Lighting should only be used where night medevac operations are planned. The lighting system should consist of a set of quality lights which are suited to the environment, durable and colored as per below.

A network of discrete lights appropriately secured in place provides a good mix of output quality and flexibility in design and maintenance. A fixed system with a ground wire fed by mains or on-site generator should be designed and constructed to international or local standards appropriate for larger aerodromes.

The basic guidelines for airstrip lighting are:

- Runway Ends: thresholds are identified by a pattern of six lights spread about the runway centerline. The pattern consists of six bi-directional red/green lights with the red lights facing the runway;
- Runway Edge: edge lights consist of white lights spaced 30m laterally and approximately 90m longitudinally, although they must be evenly spaced from runway end to end;
- Taxiway and Apron Edge Lights: these are blue lights spaced at 14m laterally and approximately 10m longitudinally;
- Wind Indicator Lighting: The windsock must be lit by appropriate floodlighting; and
- Obstacle Lights: All obstacles above 45m within 4,000m of the airstrip should be lit by steady red lights.

All light fittings in the runway environment must be frangible to avoid damage to the aircraft in the event of runway/taxiway excursion.

Remote Airstrip Lighting Layout

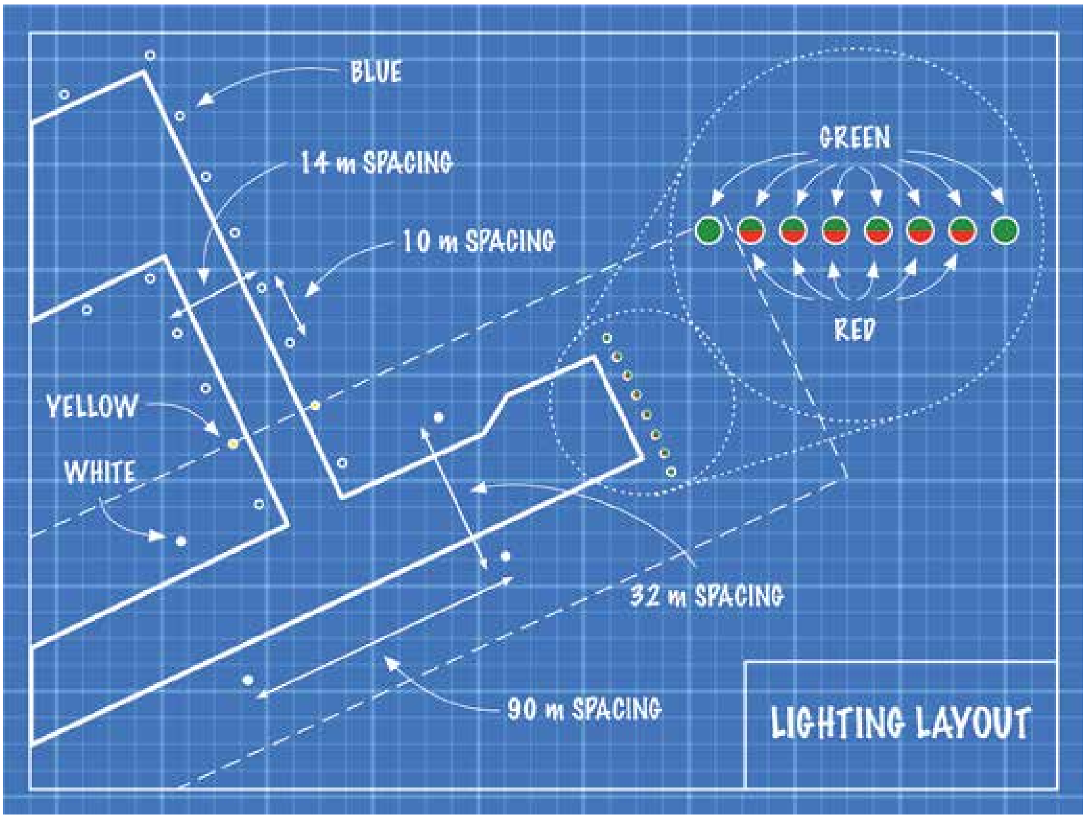


Figure 6: Lighting Layout.

Fencing

Due to the risk to aircraft posed by wildlife, some form of airport fencing should be installed unless a formal risk assessment dictates otherwise. The specifics of the fencing will vary depending on the hazards present, but care must be taken to ensure the fence does not infringe the obstacle clearance areas.

D5: Airstrip Operations

Successful short-term airstrip operation depends on pre-flight airstrip inspections and documented reporting of its serviceability. Flight monitoring, passenger control, weather reporting and emergency response in varying forms will also need to be considered.

Pre-Flight Inspections

Prior to each aircraft movement, the airstrip should be inspected and confirmed serviceable.

The inspection should be conducted by a suitably trained person driving a vehicle to assess the condition of the airstrip. The results of all inspections must be recorded in a logbook or appropriate file. The airstrip inspection should review:

- The runway surface to confirm that it is smooth and firm with minimal loose material, no vegetation and no standing water;
- The runway strip should be relatively smooth and firm with limited loose material, vegetation and standing water;
- The taxiway and apron surfaces should be in a similar condition to the runway and surface transitions observed to be within limits;
- Airstrip markers to ensure they are in position, visible and secure;
- Lights serviceability and availability (if applicable);
- The wind indicator to confirm serviceability;
- That the signal circle shows the airport's current status;
- Obstacle clearances to ensure that they have not been compromised; and
- The presence of bird and/or animals and confirm that they do not pose a risk to aircraft operations.

The following table outlines specific standards for surface serviceability:

Airstrip Facility – Inspection Item	Required Standard
Runway, Taxiway and Apron	
Surface Softness	Vehicle ruts no greater than 25mm
Debris/Loose Material	No greater than 25mm in diameter
Surface Defects	No greater than 50mm wide and 25mm deep
Vegetation	Nil
Standing Water	Nil
Surface Roughness	Comfortable @ 70–80km/h whilst driving a vehicle (preferably 3-tonne)
Runway Strip	
Debris/Loose Material	No greater than 50mm in diameter
Surface Defects	No greater than 80mm wide
Vegetation – should be no obstruction to markers or lights	If Lush – no more than 100mm high If Thin – no more than 250mm high If Sparse – no more than 450mm high
Runway Surface Transition to runway strip	No greater than 25mm drop

Surface Test

If conditions at the airstrip (recent rain etc.) indicate a strong likelihood that the runway surface is unserviceable, the surface test exercise should not be attempted as it may lead to long-term surface damage.

In marginal conditions, surface strength can be tested using a test vehicle (ideally, a 3-tonne truck) along a portion of the runway surface and checking the ruts left in the runway. The areas selected for testing should be those most likely to degrade first.

The typical maximum rut depth is outlined in the table. However, care should be taken when dealing with aircraft with small, high-pressure tires as the maximum rut depth may be lower.

Other methods, such as dry-to-depth and Clegg Hammers/penetrometers may also be used, and specialist advice should be sought to investigate use if required.

Unserviceability

When serviceability issues are encountered, the individual designated as accountable for the airstrip should attempt to rectify the problem immediately. If rectification is not possible and the issue is significant enough to warrant closure of the airstrip, the airstrip must be marked as unavailable with a white cross in the signal circle and at each end of the runway. The aircraft operator contracted to support the activity must be notified.

The white cross consists of two rectangles 6m x 0.9m secured to the ground.

Reporting

The condition of the airstrip should be reported (whether serviceable or not) to the aircraft operator prior to any operation. This reporting should involve direct communication, which can include phone calls prior to departure, or via air-band radio to the pilot prior to arrival. If fax or email is used for communication purposes, a positive reply acknowledging receipt must be obtained by the individual sending the serviceability report.

Annual Checks

Longer term airstrips (for example, emergency use airstrips supporting production operations) should be inspected by a qualified person annually. This inspection should involve:

- Checking the accuracy of aerodrome information provided to pilots;
- Looking into matters of a volatile nature, e.g. new obstacles or tree growth, changes in the movement area or the marking and lighting of the movement area, as a result of new aerodrome development;
- Inspecting matters that are subject to damage or deterioration;
- Checking the competency of aerodrome personnel involved in safety functions, and whether they are clear of their duties and responsibilities;
- Reviewing any concerns raised by the aircraft operator and pilots; and
- Reviewing whether there is any deficiency in the day to day operation of the aerodrome.

The output of this inspection should be a formalized documented report that: (1) provides a clear status of the airstrip; (2) details any rectification works; (3) provides succinct recommendations for improvement.

Flight Monitoring

Responsible personnel should be in attendance for all flights 30 minutes before the scheduled arrival through to 15 minutes following departure.

Passenger Control

The airport officer, while in attendance, should monitor the activity of passengers and intervene where safety is compromised. Access on the "airside" apron area should be strictly managed and passengers escorted at all times.

Weather Reporting

Using appropriate weather equipment, the responsible personnel may be requested to provide a weather report to incoming aircraft over the radio. It must be made clear what the basis of this information is prior to the flight.

Emergency Response

The responsible personnel may be required to assist in and coordinate an emergency response. The airport officer should be provided with appropriate tools, relevant information and necessary training to carry out this task. They should also be supported with appropriate procedures.

Responsible personnel located at the airstrip may be required to assist in and coordinate an emergency response. Support must be provided in the form of:

- An up-to-date and current Emergency Response Plan;
- Crash Box (BAR Standard 12.13);
- Rescue Firefighting (BAR Standard 12.14);
- Communication (satellite phone or other); and
- Aircraft operator contact details (or ERP Bridging Document).

D6: Maintenance

Maintenance works should be carried out according to schedule and as the result of a pre-flight inspection or annual check. These tasks will vary but may involve:

- Dragging unsealed surfaces to repair minor defects;
- Grading unsealed surface to repair larger defects (such as scouring);
- Slashing/mowing vegetation to ensure surface smoothness and marker/light visibility;
- Cleaning markers and lights;
- Replacing broken markers, lights and worn windsocks;
- Repairing fences; and
- Clearing and trimming trees.

These works should be planned and conducted in a manner that does not impact on aircraft operations. Works should be conducted outside of flight periods with the airstrip marked as closed.

E HELIPAD GUIDANCE

The helicopter operating area used for takeoff and landing is a critical control in the conduct of safe helicopter operations. Resource companies will often become involved in preparing helicopter operating areas for contracted service providers and it must be understood that poorly designed and/or located helipads will contribute towards the likelihood of a significant event occurring or the imposition of operating restrictions.

Purpose

The purpose of providing helipad guidance is to assist both the aircraft operator and the resource company in addressing the key threats that this control addresses in a risk-based fashion.

Helipad Types

To assist in the risk-based approach, two types of helipads will be considered:

1. Manned helipads. Helipads typically in support of exploration fly-camps, fixed facilities, production plants, fixed-base drill sites and static operational bases. Aircraft operator and/or resource company personnel are based at this location and able to receive and dispatch helicopter movements.

2. Normally Unmanned Helipads. These helipads are typically used in support of seismic, exploration, stream sampling, community support, wildlife support and other ad-hoc requirements. Personnel are not normally based at these helipads and they are used for short-term and ad-hoc requirements.

The delineation of manned and unmanned helipads assists when distinguishing the differing equipment requirements supporting the helipad.

While the guidance contained within this section refers to onshore helipads, all offshore helicopter landing areas should continue to refer to the relevant documents of ICAO Annex 14 Vol 2 Heliports, UK CAP 437 Helideck Standards and ICS Guide to Helicopter/Ship Operations.

Helicopter Performance Class

The Performance Class of a helicopter provides a definition around the performance capability of the helicopter and in general provides a quick understanding whether:

1. The helicopter can fly away on one engine after the other engine has failed, or;

2. Whether it will have to land because the single-engine performance (or lack of two-engines) means the aircraft cannot stay airborne under the Weight, Altitude and Temperature combinations.

The definitions are as follows:

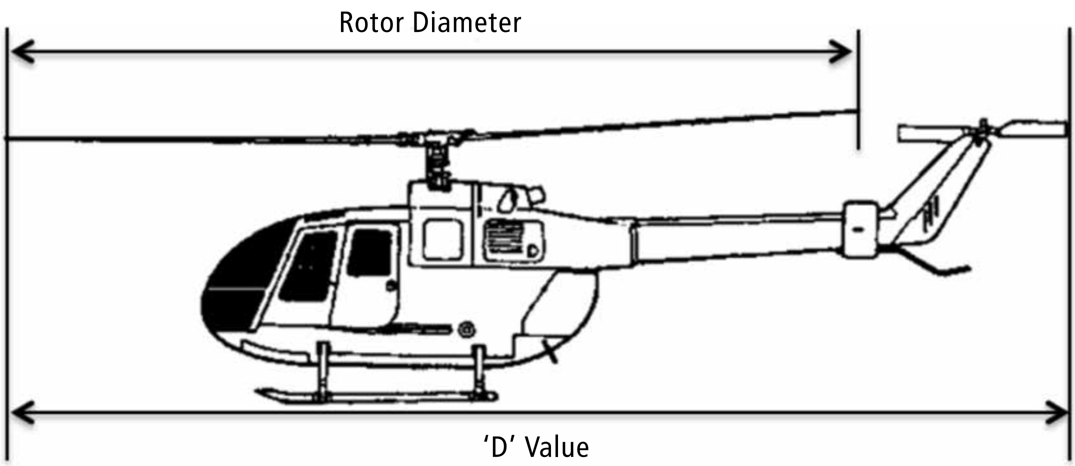
- **Performance Class 1.** Operations with performance such that, in the event of a critical engine failure, a helicopter is able to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the Takeoff Decision Point (TDP) or after passing the Landing Decision Point (LDP), in which case the helicopter must be able to land within the rejected takeoff or landing area;
- **Performance Class 2.** Operations with performance such that, in the event of a critical engine failure, a helicopter is able to safely continue the flight to an appropriate landing area, unless the failure occurs early during the takeoff maneuvers or late in the landing maneuvers, in which case a forced landing may be required; and
- **Performance Class 3.** Operations with performance such that, in the event of an engine failure at any time during the flight, a forced landing will be required.

(JAR-OPS 3.480a)

Helicopter Dimensions

Key dimensions of the helicopter (including weights) are as follows:

- **D Value** – The largest overall dimension of the helicopter when rotors are turning. This dimension will normally be measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor tip path plane (or the most rearward extension of the fuselage in the case of Fenestron or Notar tails);
- **RD** – The Diameter of the Main Rotor; and
- **MTOW** – The Maximum Takeoff Weight of the helicopter.



A table of common resource sector helicopter weights and dimensions is presented below:

Helicopter Type	Rotor Diameter (m)	D Value (m)	MTOW (kg)
MD 500	8.10	9.40	1,361
Bell 206 series	10.16	12.11	1,451
Bell 206L series	11.28	12.91	1,882
AS 350 series	10.70	10.93	2,250
Bolkow Bo105	9.84	11.86	2,400
Agusta 109	11.00	13.04	2,600
MBB BK117	11.00	13.00	3,200
Bell 212	14.63	17.46	5,080
Bell 412	14.02	17.13	5,397
Mil Mi8/17	21.29	25.24	13,000

Figures provided as a guide only. Individual models may vary. Check with aircraft operator for specific aircraft details.

Helipad Design

The purpose of the helipad is to provide an area suitable for the helicopter in use to takeoff or land. In addition to having suitable clearance, the area must be capable of supporting the weight of the helicopter when on the ground and supporting the air-loads encountered during hovering. The basic design will be influenced by the size and weight of the helicopter, as well as the Performance Class. The key components of helipad design and construction are presented in Table One and discussed in this section:

1. Helipad size	5. Rejected Area
2. Surface	6. Taxiways
3. Buffer Area	7. Parking Area
4. Approach and departure paths	8. Obstacle marking

Table 1: Helipad Design Requirements

E1: Takeoff and Landing Area Size:

- Performance Class 1 helicopters – the takeoff and landing area dimensions will be defined in the Flight Manual. If not defined, the area should have a minimum diameter of 1D; and
- Performance Class 2 and 3 helicopters – the takeoff and landing area dimensions should be a minimum of 1D for helicopters greater than 3,175kg MTOW and 0.83D for helicopters of less than 3,175 kg.

(ICAO Annex 14 Vol 2)

Where space permits, a width of 2D should be considered. Helipads sited at high-density altitudes may need a larger area to allow for the increased momentum and reduced handling qualities in the event of engine malfunction.

Hint: If the approach and landing dimensions are based on the largest helicopter type that is every likely to use the helipad, then all smaller helicopter types will automatically be capable of utilizing the helipad.

Surface

The takeoff and landing area surface must be:

- Level as possible, but not exceed 3% slope in any direction;
- Free from irregularities that affect operations;
- Strong enough to support the dynamic load of the helicopter; and
- Able to withstand rotor downwash and provide some ground effect.

(ICAO Annex 14 Vol 2)

In practice, dynamic load calculations should be based on 2.5 x the MTOW of the helicopter to account for an emergency landing.

(CAP 437)

E2: Buffer Area

A safety buffer area is also normally provided outside the takeoff and landing area that is clear of obstacles in accordance with the following:

- At least 3m or 0.5D from the edge of the takeoff and landing area (0.25D is acceptable for PC1 operations);
- Each external side of the buffer should be 2D where the takeoff and landing area is quadrilateral or be 3D diameter for circular takeoff and landing areas;
- The edge of the buffer should be clear of obstacles to a distance of 10m rising at a slope of 45 degrees from the edge of the buffer area; and
- If obstacles are required on the buffer area to manage risk (e.g. lights for night operation), they should be less than 250mm high at the edge of the takeoff and landing area and not penetrate a plane that extends outwards rising at 5% slope.

(ICAO Annex 14 Vol 2)

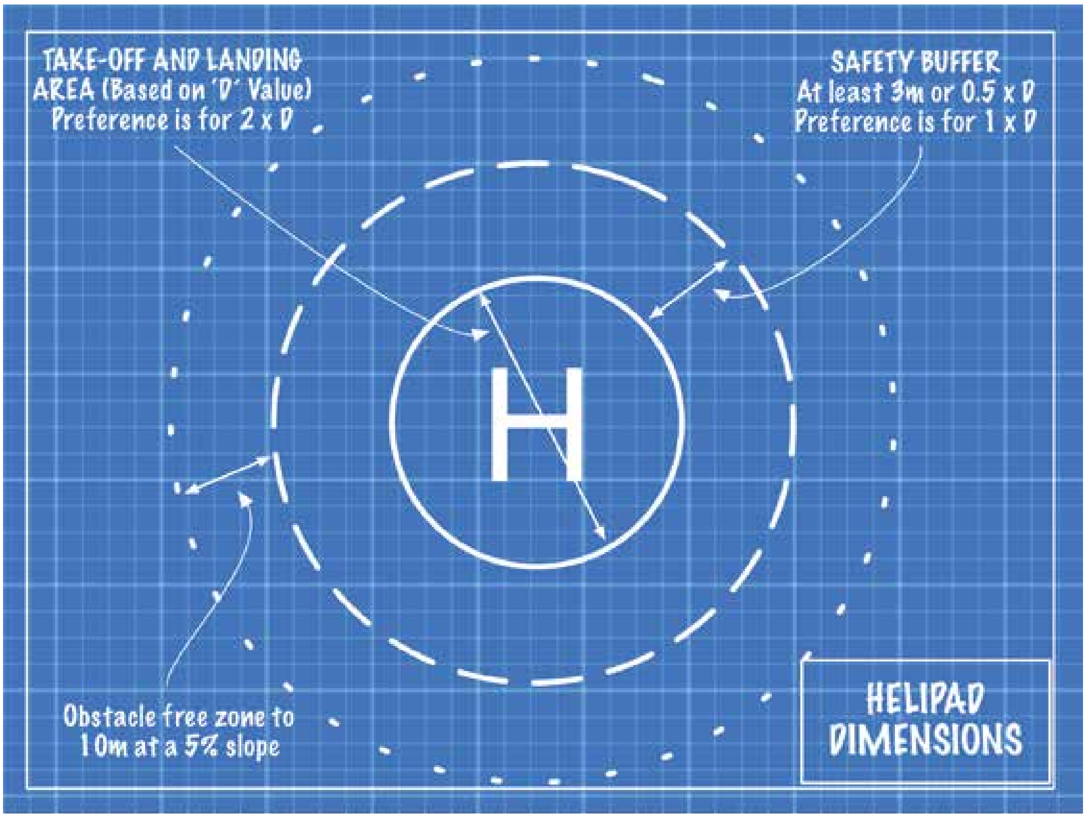


Figure 1: Helipad Safety Buffer

> Where practicable, an obstacle in the buffer area should not exceed 50mm.
>
> *(FAA AC 150/5390-2C)*

E3: Approach and Departure Paths

From a general design perspective, the helipad and the approach/departure paths should be clear of persons, objects, animals and debris. In particular special attention should be taken to ensure camp facilities, fuel caches and areas where personnel are working are avoided. Normally two paths should be provided, not less than 150° apart. This will allow for changes in wind direction to allow selection of the most appropriate landing and takeoff direction and additionally provide egress alternatives to the flight crew in the event a landing needs to be aborted.

The Approach and Departure segments begin at the edge of the takeoff and landing area and should extend outwards from the takeoff and landing area with a slope of 7.5° (1:8 ratio) to 500ft elevation above the helipad.

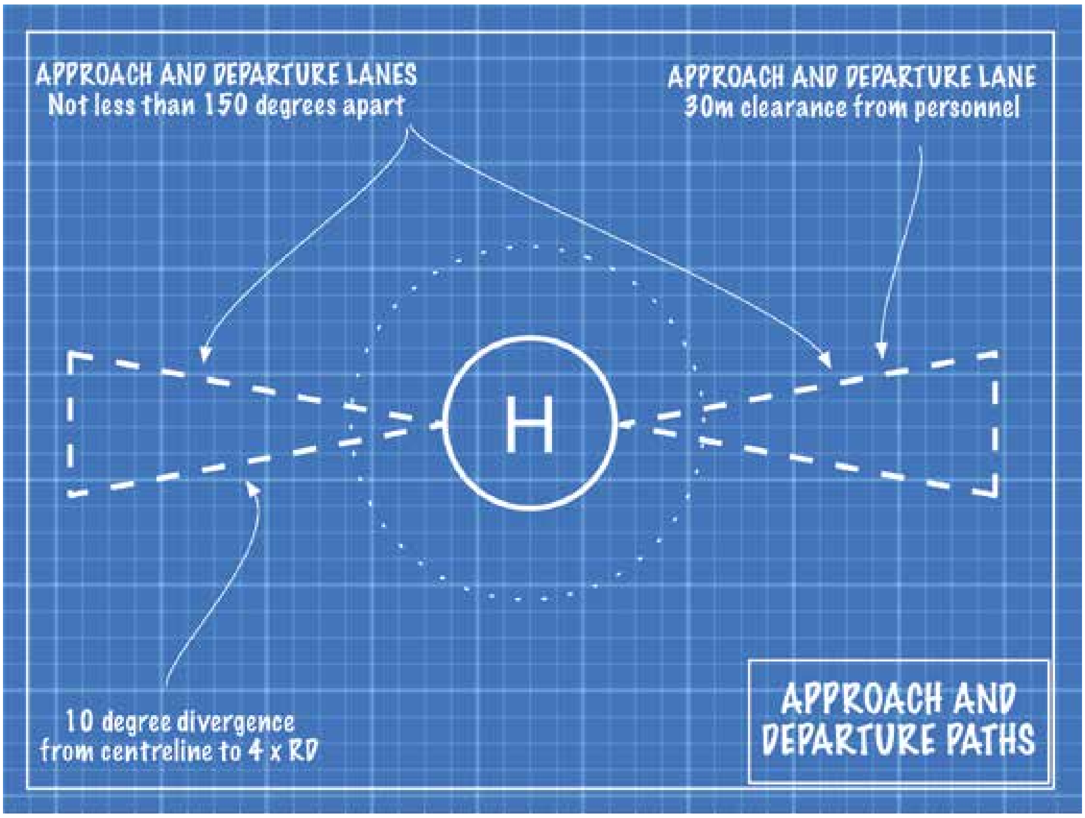


Figure 2: Vertical Approach and Departure Paths

The edges of the Approach and Departure segment should diverge at an angle of 10° to a width of 4xRD for the largest helicopter in use.

(FAA AC 150/5390-2C)

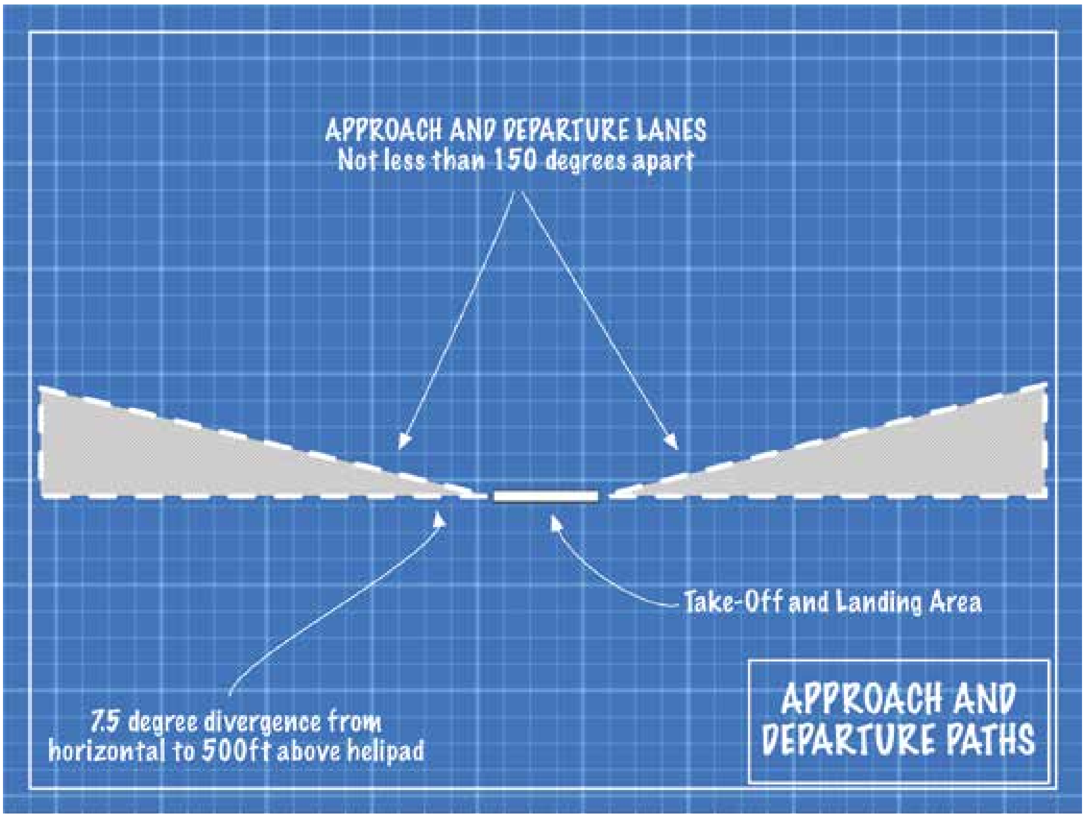


Figure 3: Horizontal Approach and Departure Paths

In high Density Altitude areas, the approach and departure paths take on a more critical role and should be a major consideration during the siting of the helipad.

Unless required to directly support the operation, personnel should remain a minimum of 30m away from the helipad in the course of operations.

E4: Rejected Takeoff Area (or 'Flyway')

For Performance Class 1 and 2 operations supporting manned helipads, a Rejected Takeoff area (or 'Flyway') should be provided to provide an area where a departure can be aborted in the event of an engine failure prior to safe single-engine fly-away speed. The distance required for the flyway will vary depending on the ambient conditions and the aircraft type. In those cases where the helipad forms part of the flyway, it will be of a rectangular design.

In all cases the approach and departure paths should be aligned with the prevailing winds as much as possible and should form a key part of the initial siting and design. Correct design and construction of the flyaway areas will also limit the time where a helicopter is exposed to the 'Avoid Area' of the Height/Velocity diagram.

E5: Taxiways

If the final parking position of the helicopter is not co-located with the takeoff and landing area (e.g. where a flyway is used for takeoff and landing, but parking is on a separate designated helipad), then helicopter taxiways need to be provided. Taxiways dimensions used should be based on the following:

Ground Taxi (using wheeled helicopters):

- Width not less than 1.5 times the wheel track; and
- Clearance from obstacles - 1.5 times rotor diameter.

Air Taxi (skid/wheeled helicopters):

- Width not less than 2 times wheel track; and
- Clearance from Obstacles 2 times rotor diameter.

(ICAO Annex 14 Vol 2)

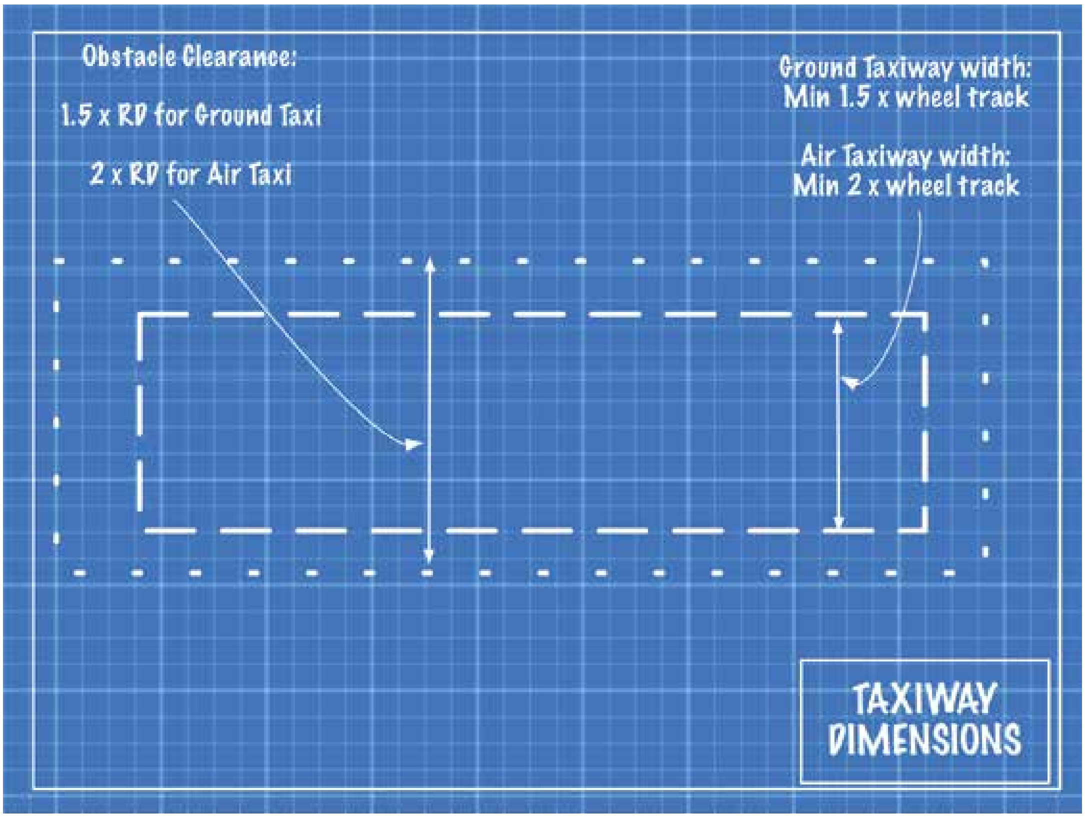


Figure 4: Helicopter taxiways

E6: Parking Area

The parking area should be a flat, level area of less than 2% slope and of sufficient strength to support the static and dynamic weight of the helicopter. The area should have a minimum of 1.2D of obstacle clearance and preferable 2D if turning is required over the parking position.

(ICAO Annex 14 Vol 2)

Separation of passengers and cargo is also a necessary consideration.

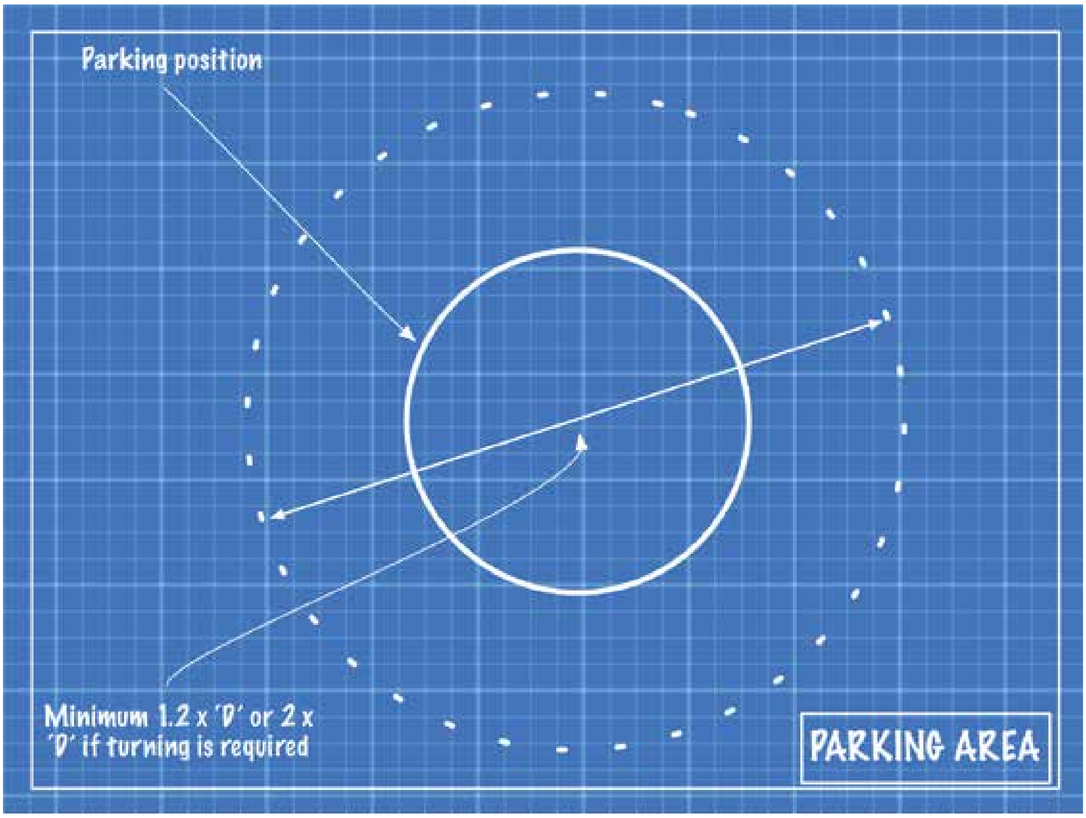


Figure 5: Helicopter Parking Area

E7: Obstacle Marking

For manned helipads, any obstacles in the area close to either the approach/departure paths or the helipad itself should be painted in a high contrast paint scheme. The preferred paint schemes are black and white, black and yellow or red and white, chosen as necessary to provide the best contrast with the surrounding environment. Paint stripes should be not less than 500mm thick and no more than 6m in length.

For night operations, a steady red obstruction light should be attached to obstacles greater than 15m in height.

(CAP 437)

Siting Considerations

The site of the helipad should be selected in order to minimize the amount of obstacle clearance required for the helipad and flyaway. It must take into consideration all maneuvering requirements of the helicopter(s) being used.

Engaging the contracted aircraft operator and/or an aviation specialist is always recommended at the siting stage for helipads.

Wind Indicator

A windsock should be provided for all manned helipads. Where the windsock is in place it should be of sufficient diameter and length to indicate wind strength and direction. It must be sited clear of the approach and departure paths, but be readily visible to pilots on approach and departure.

Marking

For permanent helipads, see ICAO Annex 14 Volume 2 for the dimensions of required markings including the perimeter and 'H'.

Where regular passenger movements occur, a passenger walkway should be marked to the takeoff and landing area.

Unmanned helipads will normally not be painted, but should be easily identifiable. Solutions include the cutting of grass to ground level, the placement of planks or logs in the appropriate locations and the placement of appropriate sized flat stones/rocks.

Lighting

Lighting should be provided for night operations, with the following lighting standard recommended:

- Takeoff and landing area – on permanent helipads, green perimeter lights or floodlights, adjusted so as not to dazzle the pilots. If either of these light systems is not practicable, either luminescent panels or segmented lights may be used. If perimeter lights are in place, they should not be more than 1.5m from the edge of the takeoff and landing area and be spaced not more than 5m apart. For circular takeoff and landing area, there should be a minimum of 14 lights. For temporary helipads, it would be normal to use portable battery powered lights to define the takeoff and landing area;
- Additional lighting should be provided unless the departure/approach and takeoff/landing areas are practically coincident. For quadrilateral shaped departure/approach areas, there should be a minimum of four equally spaced white lights, including one at each corner. For circular departure/approach areas, a minimum of 10 white lights at a maximum of 5m spacing. Portable lighting is the norm for temporary operations;
- Lead in lights (2 x green or 1 x white) should be provided along the axis of the approach path if obstacles are likely to pose a collision risk on final approach; and
- If ambient lights make the heliport difficult to identify, a procedure should be in place to extinguish these lights for night operations.

(ICAO Annex 14 Vol 2)

Construction

The construction of the helipad should be sufficient to support 2.5 x the maximum weight of the helicopter to account for emergency landings.

Permanent helipads should be constructed of concrete or asphalt and be marked with paint.

Temporary helipads may be sited on the natural surface, where this provides adequate separation from obstacles and suitable access to the area.

Where either of the above issues is present, a platform helipad should be considered, elevating the helipad above the local area. Platform helipads are normally constructed of wood where the resource is available and would not normally exceed 0.5RD height above the local surface, otherwise a loss of Ground Effect will occur. Timbers used in this type of construction should be positioned with minimum gap to reduce the possibility of a skid or wheel being caught in the gap.

Wooden helipads need to be closely monitored, particularly in tropical environments. Both loss of surface friction and loss of structural integrity are major risks to safe operations. Wood fungus and wood rot can be insidious and lead to helicopters sliding off or breaking through affected helipads. Operators should thoroughly inspect and consider these types of pads during their Operational Risk Assessment process and apply operational restrictions as necessary.

The helipad surface should be as firm as possible and natural surface may need reinforcing (timber, Marsden Matting, crushed rock, etc.) to support the skids or wheels of the helicopter. The touchdown surface should be cleared for a minimum of 2 x the footprint of the helicopter.

Operations

If multiple helicopter operating areas are provided, the safety buffer areas must not overlap if simultaneous operations are planned.

(ICAO Annex 14 Vol 2)

Fuel

Fuel equipment and storage should be protected from any flying shrapnel that may be ejected during a helicopter roll over. Suggested separation distances are 50ft for equipment and 100ft for fuel storage.

Hot refuel operations will trigger additional considerations (see BARS Control 3.6).

Sling Load Operations

Where the helipad is also to be used for sling load operations, additional clearances and appropriate laydown areas will also need to be considered during the design phase. It is critical that the Operator or aviation specialist is consulted to determine the minimum design criteria they will accept for sling load operations.

Rescue Firefighting

Rescue Firefighting capability should be subject to a risk assessment. (See BARS Defence 13.14).

There are a number of reference documents related to applicable firefighting standards. While the ICAO recommended Rescue and Firefighting (RFF) capability is based on the length of the helicopter (see table below), this capability would only be expected for consideration when supporting a manned helipad with continuous ongoing operations. For short term operations (e.g. seismic campaigns) into unmanned helipads the same solution is not practical.

The following guidance should be considered for manned helipads.

Fire retardant should consider water and foam, plus one of the complementary agents (Dry Chemical, Halon or CO_2). An example of ICAO requirements is as follows:

Category	**Overall length of helicopter**	**Water and Foam (lt)**	**Dry Chemical (kg)**	**Halon (kg)**	**CO_2 (kg)**
H1	15m or less	500/250	23	23	45
H2	15-24m	1,000/500	45	45	90
H3	>24m	1,600/800	90	90	180

(ICAO Annex 14 Vol 2)

A crash box meeting the requirements of BARS Defence 12.13 should also be provided at all manned helipads, as well as ready access for Emergency Response crews.

Maintenance and Management

All helipads should be effectively managed with an inspection and maintenance program to ensure ongoing suitability for operations. Permanent concrete and asphalt helipads require little upkeep, other than to ensure that markings and obstacles remain clear and readable to support operations.

In tropical environments wooden helipads should be inspected more frequently to take into account wood fungus and rot. A life limit may be appropriate and in some cases have been known to be as little as three months. It is recommended that engineering advice and the input from the helicopter operator be sought regarding construction and ongoing structural integrity inspection requirements. Natural surface helipads should be monitored weekly to confirm they are still suitable for ongoing operations.

Every helipad should have a single point of accountability appointed to oversee the operation and serviceability of the helipad. This can be the resource company or the helicopter operator. This single point of accountability should be responsible for the conduct and upkeep of risk assessments, confirmation that the above requirements are in place, and that an inspection schedule and associated record keeping is undertaken.

Medevac Helipads

The establishment of either permanent unmanned or the creation of an emergency Medevac helipad is normally a consideration under the Emergency Response Plan. Permanent unmanned Medevac helipads should conform where practicable to the provided guidance. Emergency Medevac helipads should provide clear approach and departure paths and a takeoff and landing area that is of sufficient size to permit the helicopter to come to a low hover or land. In such cases, obstacles need to be cleared below the level of the rotor system and around the fuselage area.

F BARS MEMBER ORGANIZATION (BMO) – RELEVANT CONTROLS

F1: Company Awareness

Accident and Incident Notification

As part of their SMS, the aircraft operator must advise the company of any incident, accident or non-standard occurrence related to the services provided to the company that has, or potentially has, disrupted operations or jeopardized safety.

Operational Risk Assessment

Aircraft operators must conduct a risk assessment, including mitigation controls, before commencing operations for any new or existing aviation activity. Contact the Flight Safety Foundation for information on how to conduct a risk assessment.

Night Medical Evacuation (Medevac) Policy

When required for the operation, the company must consult with the aircraft operator to develop a night Medevac policy. Flights should only be conducted in life threatening situations and where stabilization until first light is not an option. The final decision must be made by the Offshore Installation Manager (OIM) in consultation with medical staff and the aircraft operator.

F2: Airfield and Helipad Requirements

Airfield and Helipad Design

Where local guidance is unacceptable to the company, use ICAO Annex 14 Aerodromes, Volume I ('Aerodrome Design and Operation') and ICAO Annex 14, Volume II ('Heliports') for design considerations when constructing, or performing major rework, to permanent long-term company owned and operated airfields and helipads supporting operations.

Consider prevailing winds and the location of mining/facility infrastructure in relation to the proposed airfield or helipad departure and approach splays.

BARS Implementation Guidelines (BIG) Section 4 provides additional guidance for short-term or emergency use airfields whilst Section 5 provides additional guidance for helipad standards.

Airfield Inspections

In addition to reviews required by regulators, all company owned and/or operated airfields must have an annual operational control and safety review conducted by a company approved Competent Aviation Specialist.

Airfield Control

All company owned and operated airfields must have personnel who are responsible for overseeing and managing the airfield and operating standards. Responsibilities include having a basic understanding of the local aviation regulatory system, certification requirements of the airfield and daily airfield reporting officer duties.

Destination Weather Reporting

For company owned and operated airfields and helidecks, communicate the following data to arriving aircraft by either an Automatic Weather Observation System (AWOS) and/or trained weather observer:

- Wind direction and speed;
- Temperature;
- Barometric pressure; and
- Cloud ceiling height and visibility.

Maintain all equipment on a current calibration register.

Passenger Terminal Area

Company owned and operated airfields must have a waiting area for passengers offering security, basic amenities, protection from the elements and a barrier from the aircraft movement area. Incoming and outgoing passenger routes must be designated.

Designated Freight Area

Company owned and operated airfields, helipads and helidecks must have a designated and secure freight area that provides a controlled environment clear of the aircraft movement area and public thoroughfare.

Passenger Control

A designated Passenger Control Officer (PCO) or Helideck Landing Officer (HLO) who is in a position to communicate with the crew at all times must control all passenger movements to and from the designated aircraft movement area. The PCO can be provided by the company or aircraft operator, and may be a crew member in a multi-crew operation.

The PCO and HLO must be identified using a distinguishing vest if they are not a crew member of the aircraft.

Parking Apron

For all company owned and operated airfields, the parking apron area must be assessed by the aircraft operator as being suitable for their type of aircraft. Consider other transient aircraft traffic, helicopter operations, refueling, and the Pavement Classification Number (PCN). For long-term operations where practical, taxi lines specific to the contracted aircraft type must be painted in the apron area for obstacle-clearance maneuvering purposes.

Perimeter Fence

Construct a perimeter fence around all company owned and operated airfields to prevent access by livestock, other animals and traveling pedestrians.

Airfield Bird Control

Conduct active bird control at all company owned and operated airfields when required and record the presence of birds periodically. Where possible, birds are must be dispersed or removed in accordance with local wildlife regulations. Seeding grass, open waste disposal and water ponds must be restricted to remove attractions for birds.

Where bird activity exists, aircraft operators must minimize the risk of bird strike during all operations.

Emergency Response Plan

All aircraft operations (including company owned or operated airports) must have an Emergency Response Plan (ERP) commensurate with the activity undertaken that covers: documented land-before-last-light limitations, exposure considerations, local Search and Rescue (SAR) capabilities, and hazards associated with the surrounding environment.

The ERP must be exercised annually for all long-term operations and include a bridging document detailing lines of communications between the company and aircraft operator.

Crash Boxes

Company owned and operated landing sites supporting long-term operations must have a crash box accessible to personnel at the airfield or primary helipad.

Rescue Firefighting

All company owned or operated helipads or airfields must have a means of providing a fire response capability commensurate with the potential risk. Personnel must receive training on the equipment provided.

Contact:

BARS Program Office

Flight Safety Foundation
Regional Office
GPO Box 3026
Melbourne, Victoria 3001, Australia

Telephone: +61 1300 557 162

Email: BARS@flightsafety.org
Web: www.flightsafety.org/bars

Flight Safety Foundation
Head Office
701 N. Fairfax Street, Suite 250
Alexandria, Virginia US 22314-2058

Telephone: +1 703 739 6700
Fax: +1 703 739 6708

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