

Basic Aviation Risk Standard

Implementation Guidelines



Benefactor BARS Member Organizations



RioTinto

BARS Member Organizations



Incitec Pivot Limited

Newmont



FREEPORT-McMoRAN
COPPER & GOLD

GLENCORE

LAGSA



Baffinland



Essential
Energy



wood.



Teck



"Awareness and understanding of risk, whatever the task, is everybody's responsibility. Within aviation activities, it is vital that all personnel understand the critical control management of major risks involved within the task. It is only by mitigating those risks, that we can achieve safer operations."

Hassan Shahidi, President and CEO, Flight Safety Foundation

BARS IMPLEMENTATION GUIDELINES

Contents

Glossary of Terms and Abbreviations.....	12
Introduction	24
Purpose	24
Document Structure	24
Variances	25
BARS Audit and Company Operational Review	26
Two-dimensional Approach to Aviation Assurance	26
BARS Accredited Audit	27
Company Specific Operational Review	27
1.0: All Threats: Common Controls	30
1.1: Safety Leadership and Culture	30
1.2: Safety Intelligence	31
1.3: Approved Aircraft Operator	32
1.4: Flight Crew Qualifications, Experience and Recency	33
1.5: Flight Crew Check and Training.....	35
1.6: Maintenance Personnel Qualification	38
1.7: Maintenance Training	39
1.8: Basic Aircraft Equipment Fit	39
1.9: Personnel Readiness	40
1.10: Flight Time Limits.....	41
1.11: Flight Crew Duty Time	41
1.12: Maintenance Duty Time	42
1.13: Aircraft Operator Safety Management System	43
1.14: Accident and Incident Notification	44
1.15: Operational Risk Assessment	44
1.16: Sub-chartering Aircraft.....	45
2.0: Runway Excursions	46
2.1: Airfield and Helipad Design	47
2.2: Airfield Inspections	48
2.3: Landing Site Assessments.....	48
2.4: Balanced Field Length	49
2.5: Balanced Field Length – No Performance Charts.....	50
2.6: Destination Weather Reporting.....	51
2.7: Slope guidance	51

3.0: Fuel Exhaustion.....	52
3.1: Fuel Check	53
3.2: Flight Plan Weather Data.....	54
3.3: Flight Plan.....	54
3.4: Instrument Flight Rules (IFR) Fuel Plan	55
3.5: Visual Flight Rules (VFR) Fuel Plan.....	56
3.6: Hot Refueling	56
4.0: Fuel Contamination.....	59
4.1: Fuel Testing.....	59
4.2: Fuel Filtration	60
4.3: Fuel Sampling.....	60
4.4: Fuel Storage	61
4.5: Drummed Fuel	62
5.0: Controlled Flight Into Terrain (CFIT).....	63
5.1: Two Crew Operations.....	64
5.2: Night or IFR – Aircraft	65
5.3: Night or IFR – Flight Planning	66
5.4: Night or IFR – Simulator Training	66
5.5: Night or IFR – Approach/Landing Recency.....	67
5.6: Night or IFR – Autopilot	67
5.7: Stabilized Approaches.....	68
5.8: Mandatory Go-around Procedures	69
5.9: Terrain Awareness Warning System (TAWS)	70
6.0: Loss of Control – In-flight (LOC-I)	71
6.1: Automation Policy.....	71
6.2: Multi-crew Operations	72
6.3: CRM/ADM Training	73
6.4: Flight Data Monitoring	74
6.5: Line Operations Safety Audit (LOSA)	75
6.6: Electronic Flight Bags (EFB)	76
6.7: Fire Containment Bag.....	77
7.0: Incorrect Loading.....	78
7.1: Passenger Weight	79
7.2: Cargo Weight and Loading	80
7.3: Load and Trim Calculations.....	80
7.4: Manifest	81
7.5: Dangerous Goods Cargo (Hazardous Materials)	82
7.6: Passenger Briefing	83
7.7: Multi-language Briefing	84
8.0: Collision on Ground	85
8.1: Passenger Terminal Area	85
8.2: Designated Freight Areas	86

8.3:	Passenger Control.....	86
8.4:	Ground Procedures	87
8.5:	Pilot at Controls	87
8.6:	Parking Apron	88
8.7:	Perimeter Fence.....	89
8.8:	Airfield Control.....	90
9.0:	Collision in Air.....	91
9.1:	Cruising Altitudes	91
9.2:	Air Traffic Control (ATC) Oversight	92
9.3:	Airfield Bird Control	92
9.4:	Traffic Collision Avoidance System (TCAS)	93
9.5:	High Intensity Strobe Lights.....	94
10.0:	Structural or Mechanical Failure.....	95
10.1:	Single-engine Aircraft	95
10.2:	Multi-engine Aircraft.....	95
10.3:	Supply of Spares	96
10.4:	Hangar Facilities	98
10.5:	Helicopter Vibration Monitoring	99
10.6:	Engine Trend Monitoring	99
10.7:	Minimum Equipment List (MEL).....	100
10.8:	Aural Cabin Pressure Warning System	100
10.9:	Critical Maintenance Tasks (CMTs) and Independent Inspections	101
11.0:	Weather	102
11.1:	Adverse Weather Policy.....	102
11.2:	Thunderstorm Avoidance.....	103
11.3:	Weather Radar	104
11.4:	Wind Shear Training.....	105
11.5:	VFR Minimum Requirements	106
11.6:	Cold Weather Training	106
11.7:	Mountain Flying Training (Helicopters)	108
12.0:	Medical Evacuation.....	110
12.1:	Securing of Medical Equipment.....	110
12.2:	Weight and Balance	111
12.3:	Medical Transfers	111
12.4:	Communications.....	112
12.5:	Risk Assessment	113
12.6:	Equipment Documentation	113
12.7:	Equipment Inspection Schedule	114
12.8:	Provision of Oxygen	114
12.9:	Flight Crew Qualifications, Experience and Recency	115
12.10:	Cleaning of Aircraft Post Evacuation Mission	115
12.11:	Arrival at Destination (Destination Arrival or Transit Planning).....	117

19.0: Aircraft Accident.....	118
19.1: Aircraft Certification Standards.....	118
19.2: Emergency Response Plan	118
19.3: Emergency Locator Transmitter.....	120
19.4: Satellite Flight Following	120
19.5: Flight Following	121
19.6: Survival Kit.....	122
19.7: Flight Crew PLB	123
19.8: First-Aid Kit	124
19.9: Passenger Dress Requirements	124
19.10: Cockpit Voice Recorder (CVR)/Flight Data Recorder (FDR)	125
19.11: Upper Torso Restraint	126
19.12: Limitations in Sideways Seating.....	127
19.13: Crash Boxes	128
19.14: First Response to Aircraft Incident on Airfield	129
19.15: Insurance	130
19.16: Post Event Management.....	130
Appendices.....	131
Appendix 1: Flight Crew Qualifications, Experience and Recency	132
Appendix 2: Basic Aircraft Equipment Fit.....	133
Appendix 4: External Load Operations.....	134
20.0: Fuel Exhaustion.....	135
20.1: Fuel Reserve.....	135
20.2: Low Level Light.....	136
21.0: Failure of Lifting Equipment	137
21.1: Lifting Equipment	137
21.2: Servicing Schedule	138
21.3: Visual Inspections.....	138
21.4: Shackles.....	139
21.5: Line Shock Load.....	140
22.0: Inadvertent Load Release	141
22.1: Manual and Electrical Release Mechanism.....	141
22.2: Standardized Controls.....	141
22.3: Guarded Release Switch.....	142
22.4: Load Construction.....	142
22.5: Flight Plan Management	143
23.0: In-flight Loss of Control	144
23.1: Pilot Experience.....	144
23.2: Pilot Daily Flight Times	145
23.3: Instrument Remote Indicators.....	145

23.4: Standard Operating Procedures	146
23.5: External Mirrors.....	147
23.6: Load Weight.....	148
23.7: No Carriage of Passengers.....	148
24.0: Line Fouling In Transit	149
24.1: Weighted Lines	149
24.2: Never Exceed Speeds	150
24.3: Maneuver Boundary Envelope	150
24.4: Short-Line (<50 feet).....	151
25.0: Ground Loss of Control.....	152
25.1: Ground Briefing	152
25.2: Aircraft Ground Control.....	153
25.3: Ground Personnel	153
25.4: Ground Personnel - Training	154
29.0: Aircraft Accident.....	155
29.1: Flight Crew Helmets	155
29.2: Flight Following	155
Appendix 5: Night Vision Goggles (NVG) Operations.....	157
30.0: NVG Failure	159
30.1: NVG Standard	159
30.2: NVG Power Supply	159
30.3: NVG Compatibility	160
31.0: Flight Considerations.....	161
31.1: Weather.....	161
31.2: Flight Rules	162
31.3: Risk Assessment	162
31.4: Dispatch Procedure.....	163
32.0: Helicopter Compatibility.....	164
32.1: Helicopter Certification Status	164
32.2: Helicopter Crewing	164
32.3: Helicopter Lighting	165
32.4: Radar Altimeter	165
32.5: Terrain Awareness Warning System (TAWS)	166
32.6: Autopilot.....	166
32.7: Moving Map.....	167
32.8: Multi-engine Aircraft.....	167
33.0: Flight Crew Experience	168
33.1: Flight Crew Experience Requirements	168
33.2: Flight Crew Training.....	168
33.3: Pilot Command Time	169

33.4: Specialist Experience	170
33.5: Crew Resource Management (CRM) Training	170
34.0: Flight Crew Recency.....	171
34.1: Flight Time Recency	171
34.2: Manipulative Recency	172
34.3: Flight Duration	173
35.0: General NVG Considerations	174
35.1: Operational Crew	174
35.2: Authorization	174
35.3: Standard Operating Procedures	175
Appendix 6: Airborne Geophysical Survey Operations	176
40.0: Personnel	177
40.1: Aircrew Experience and Recency	177
40.2: Flight Crew Remuneration	178
40.3: Two-pilot Operations (Fixed-wing)	178
40.4: Single-pilot Operations (Fixed-wing)	178
40.5: Supervisory Personnel	179
41.0: Aircraft Equipment	180
41.1: Turbine Engines	180
41.2: Aircraft Canopy	180
41.3: Upper Torso Restraints.....	180
41.4: Oxygen Supply.....	181
41.5: Supplemental Type Certificate (STC).....	181
41.6: Radio Altimeter	182
41.7: Helicopter Flotation Equipment.....	182
41.8: Securing Cockpit Equipment	183
41.9: Aircraft Heater and Air Conditioning	183
41.10: Aircraft Radios and Transponder	183
42.0: Survey Towed Device.....	184
42.1: Helicopter External Load Requirements	184
42.2: Weak Links.....	184
42.3: Inspection Program.....	185
42.4: Sling Equipment.....	185
42.5: Synthetic Cables	185
43.0: Survey Flight Operations	186
43.1: Risk Assessment	186
43.2: Pre-survey Reconnaissance Flight.....	186
43.3: RPAS Simultaneous Operations (RPAS SimOps)	187
43.4: Aircraft Survey Simultaneous Operations (Survey SimOps)	187
43.5: Minimum Survey Heights	188

43.6: Transit Altitude.....	188
43.7: Survey Speed – Fixed-wing	189
43.8: Survey Speed – Rotary-wing	189
43.9: Turning Radius	190
43.10: Night Instrument Flight Rules (IFR).....	190
43.11: Minimum Temperature	190
43.12: Performance Monitoring.....	191
43.13: Reflights	191
43.14: Offshore Surveys.....	192
44.0: Fatigue	193
44.1: Single-pilot Flight and Duty Time	193
44.2: Two-pilot Flight and Duty Time	194
44.3: Fatigue Management Considerations	195
44.4: Accommodation	195
49.0: Defences	196
49.1: Satellite Flight Following	196
49.2: Local Flight Following	196
49.3: Emergency Response Procedures	197
49.4: Crew Clothing	198
49.5: Crew Helmets	199
49.6: Survival Kit.....	199
49.7: Life Jackets	200
49.8: Liferafts	201
49.9: Underwater Escape Training	201
49.10: Crew Personal Locator Beacon (PLB)	202
Appendix 7: Air Drop	203
50.0: Incorrect Loading.....	204
50.1: Loadmaster Proficiency	204
50.2: Dropmaster Proficiency	204
50.3: Cargo Weight	204
50.4: Aircraft Loading.....	204
50.5: Dangerous Goods Cargo.....	204
50.6: Load and Trim Calculations	205
50.7: Pallet Loading	205
51.0: Loss of Control – In-flight (LOC-I)	206
51.1: Air Drop System (ADS) Serviceability	206
51.2: Dropmaster Restraint.....	206
51.3: ADS Preflight System Checks	206
51.4: ADS Minimum Equipment List (MEL).....	206
51.5: Flight Crew Proficiency	206
51.6: Air Drop Emergency Checklist	206

51.7: Securing of Load	207
51.8: Standard Operating Procedures (SOPs)	207
52.0: Collision in Air.....	208
52.1: Simultaneous Drop Zone Operations	208
52.2: Airfield Proximity	208
52.3: Traffic Collision Avoidance System (TCAS)	208
52.4: Bird Awareness and Control	208
52.5: Remote Piloted Aircraft System (RPAS) Awareness	208
52.6: Dispatch Schedule Planning.....	209
52.7: Alternate Drop Zone	209
53.0: Drop Zone (DZ) Miss	210
53.1: DZ Coordinator Proficiency	210
53.2: DZ Dimensions.....	210
53.3: DZ Marking	210
53.4: DZ Orientation.....	210
53.5: DZ Communications	210
53.6: DZ Weather Reporting.....	210
53.7: DZ Ground Equipment.....	211
53.8: DZ Management	211
53.9: Approved DZ Register	211
54.0: Unplanned Event.....	212
54.1: Operational Risk Assessment (ORA)	212
54.2: English Language Proficiency.....	212
54.3: Contract Technical Schedule	212
54.4: Aircraft Operator Compliance	212
54.5: Aircraft Operator Post-Flight Report.....	212
55.0: Inadequate Infrastructure	213
55.1: Airfield Meteorological Equipment	213
55.2: Windsock	213
55.3: Airfield Fuel Facility	213
59.0: Defences	214
59.1: Emergency Response Procedures	214
59.2: Bridging Document	214
59.3: DZ Command Post	214

Annexes	215
Annex A: Hostile Environment Considerations	216
Annex B: Competency – Based Training and Assessment	218
Element 1: Selection Process	218
Element 2: Competency Model and Core Competencies	219
Core Competency 1: Problem – Solving and Decision – Making.....	220
Core Competency 2: Situational Awareness	220
Core Competency 3: Workload Management.....	220
Core Competency 4: Application of Procedures	221
Core Competency 5: Flight Path Management – Automatic Flight.....	221
Core Competency 6: Flight Path Management – Manual Flight	221
Core Competency 7: Communication	222
Core Competency 8: Leadership and Teamwork.....	222
Core Competency 9: Application of Knowledge	223
Element 3: Evidence – Based Training	224
Element 4: Flight Crew Category System	224
Element 5: Assessment for Progression	224
Element 6: Use of Simulators	224
Element 7: Training and Checking Manual Inclusions	225
Annex C: Fatigue Risk Management System (FRMS) Assessment.....	226
Annex D: Short-Term or Emergency-Use Airstrip Operations	228
D1: Design of the Short-term Airstrip	229
D2: Obstacle Clearance	230
D3: Airstrip Siting	232
D4: Airstrip Construction.....	233
D5: Airstrip Operations	237
D6: Maintenance	240
Annex E: Helipad Guidance	241
E1: Takeoff and Landing Area Size:.....	243
E2: Buffer Area	244
E3: Approach and Departure Paths	245
E4: Rejected Takeoff Area (or 'Flyway')	247
E5: Taxiways.....	247
E6: Parking Area	248
E7: Obstacle Marking	249
E8: Siting Considerations	249
Annex F: IAGSA Reconnaissance Flight Checklist.....	253
Annex G: Simultaneous Operations (SimOps) Plan	256
Annex H: BARS Member Organization (BMO) – Relevant Controls	258
H1: Company Awareness.....	258
H2: Airfield and Helipad Requirements	258

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.
ADM	Aeronautical Decision Making
ADS	Air Drop System
ADS-B	Automatic Dependent Surveillance - Broadcast
AELTS	Aviation English Language Test Services
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.

Term	Definition
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.
AOC	Air Operator's Certificate
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.
Automatic Flight Control System (AFCS)	The AFCS is a system that integrates the flight director with the Autopilot systems.
ATC	Air Traffic Control
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.

Term	Definition
Bridging Document	A document agreed to between the contracting company and the aircraft operator listing key personnel and contact details of both parties.
CAA	Civil Aviation Authority
Cabin Crew	A crew member who performs, in the interest of the safety of passengers, duties assigned by the operator or the Pilot-in-Command of the aircraft, but who shall not act as a flight crew member.
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.
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.

Term	Definition
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 (DG)	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.
DZC	Drop Zone Coordinator
DZ	Drop Zone
EFB	Electronic Flight Bags (EFB)
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.
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.

Term	Definition
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.
FAA	Federal Aviation Authority (USA)
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 feet above airfield elevation in standard conditions.
Flight Crew	A licenced crew member charged with duties essential to the operation of an aircraft during a flight duty period.
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.

Term	Definition
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.
GA	General Aviation
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.
Helicopter Landing Site (HLS)	An area of land or water, or an area on a structure on land, intended for use wholly or partly for the arrival or departure of helicopters.
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.
High Frequency (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. Further discussion provided in Annex A.
Hot Refueling	The conduct of refueling the aircraft (or helicopter) with one or more main engines running.
HUET	Helicopter Underwater Escape Training.

Term	Definition
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.
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.

Term	Definition
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 responsible regulatory authority.
Night Vision Goggles (NVG)	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 (NVIS)	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.

Term	Definition
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.
ORA	Operational Risk Assessment.
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.
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.

Term	Definition
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.
RPAS	Remote Piloted Aircraft System.
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.
SoM	System of Maintenance
SOP	Standard Operating Procedure.
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.

Term	Definition
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.
Task Specialist	A person assigned by the aircraft operator or a third party, or acting as an undertaking, who performs tasks on the ground directly associated with a specialized task or performs specialized tasks on boards or from the aircraft. Examples include shooters, darters, counting personnel in animal management, ground crew engaged in helirig operations and linesmen in utility and energy sector operations.
TDP	Takeoff Decision Point.
Technical Crew Member	Any crew member in commercial air transport emergency medical services, helicopter hoist operations, geophysical activities, fire-fighting missions or any night vision imaging system operations assigned by the operator to duties in the aircraft or on the ground for the purpose of assisting the flight crew and which may require the operation of specialised on-board equipment.
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.

Term	Definition
Ultra High Frequency (UHF)	A radio band used for two-way communications. Limited to line-of-sight communications.
UMS	Unit Monitoring System.
Upper Torso Restraint	Aircraft seatbelts incorporating shoulder straps. Can be either a three point, four point or five point harnesses.
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.
VMS	Vibration Monitoring System.
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 engine 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 medevac.

The text of the control or defence may contain the term 'appropriate' as a descriptor of a particular element of the requirement. The supporting Implementation Guidelines will provide additional context to the use of 'appropriate'.

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

Safety Goal - Each BARS control and defence has been provided with a Safety Goal to assist users of the Implementation Guidelines to identify the purpose of the control or defence and a pathway towards creating a performance indicator to measure the effectiveness of the organization in achieving a desired level of safety performance.

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

There will be occasions where the BMO will determine that a Variance to the BARS Controls or Defences is required to permit ongoing operations. Any variance is at the discretion of the company in consultation with the aircraft operator. Each Variance should be risk assessed by the BMO/Competent Aviation Specialist before approval is granted.

During the risk analysis of any variance, the following factors should be considered:

- The circumstances impacting on the Operator's inability to satisfy the BARS Control or Defence;
- Is this an ongoing or only temporary situation;
- Are the operations short term, ad hoc or longer term; and
- Is the variance wide-ranging or only affecting one particular operation/location?

All variances should be clearly documented and regularly monitored and reviewed to assess continued applicability.

A schematic of the process is outlined in Figure 2.

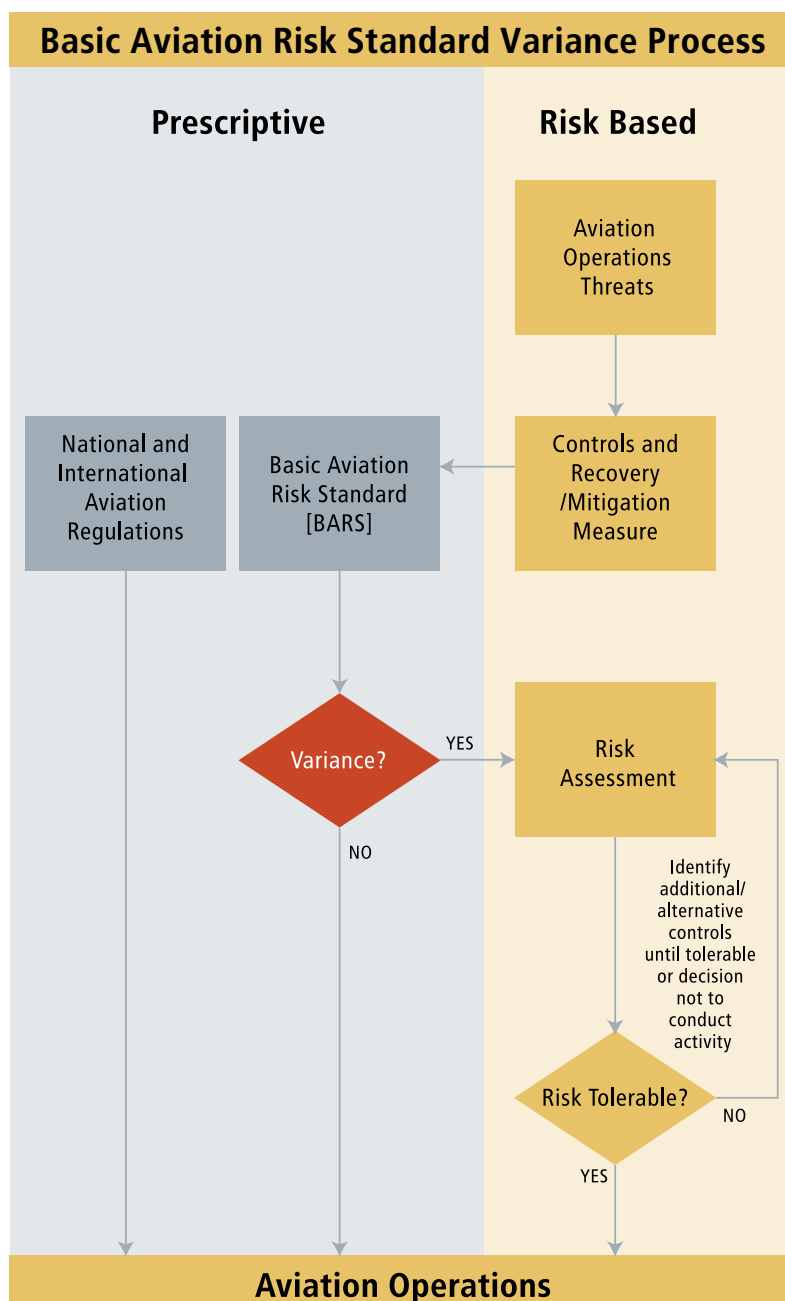


Figure 2: Variance Process.

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 3.

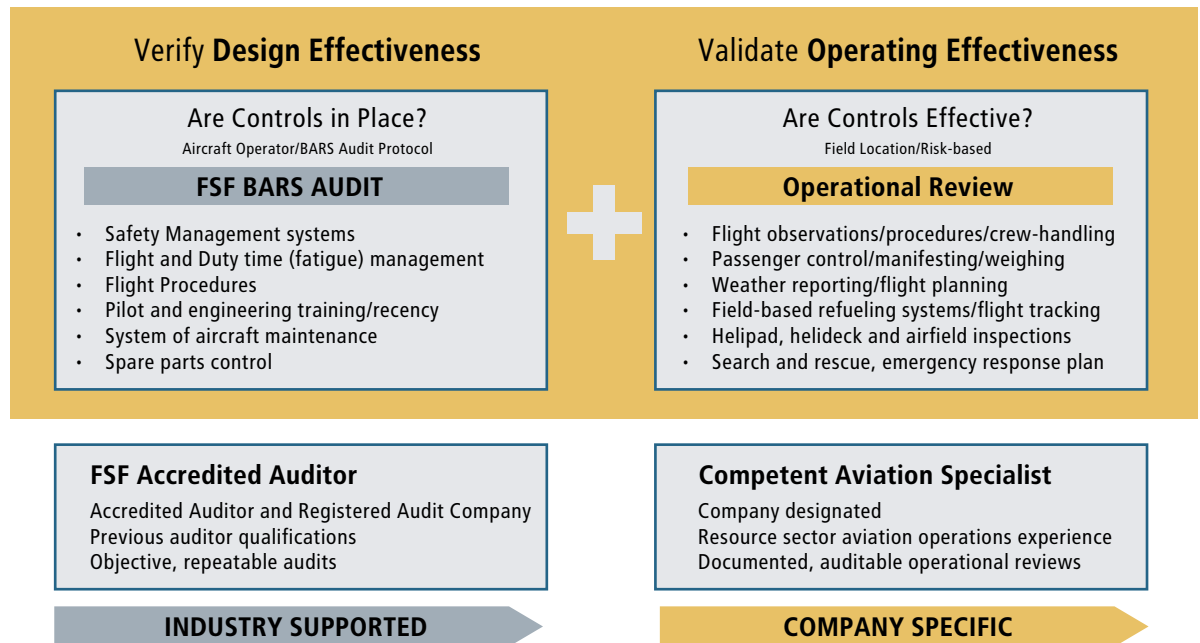


Figure 3: Two-dimensional approach to aviation risk management

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 BMOs 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 1: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls



Version 10, May 2024

and Recovery Measures.

- Destination Weather Reporting
- Slope Guidance

- VFR Fuel Plan
- Hot Refueling

- Drummed Fuel

- Stabilized Approaches
- Go-around Procedures
- TAWS

- Electronic Flight Bags (EFB)
- Fire Containment Bag

- 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

- Cold Weather Training
- Mountain Flying Training (Helicopters)

- Cleaning of Aircraft Post Evacuation Mission
- Arrival at Destination

Aircraft Accident



Recovery Measures:

Aircraft Certification Standards

Emergency Response Plan (ERP)

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

First Response to Aircraft
Incident on Airfield

Insurance

Post Event Management

1.0: All Threats: Common Controls

Common controls that apply to all threats outlined in this 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 contracted aviation operations. These common controls are discussed further in this section.

1.1: Safety Leadership and Culture

Ensuring an organizational culture where the normal behavior at all levels is risk conscious, safe, learning and collaborative behavior.

All organizations must demonstrate an active commitment to safety. They must actively encourage and promote a positive safety culture within their organization through development of safety leadership skills, behaviors and authentic engagement of their entire workforce. They must regularly evaluate their culture as part of their Safety Management System (SMS) using safety culture surveys or analysis of other indicators.

All organizations have a 'culture'. In this context the term safety culture is used to represent the collective values, beliefs expectations, commitments and ultimately the behavioral norms of members of the organization, in relation to safety. The resulting behavior is particularly important because it provides observable evidence and influences the behavior of others.

Professor James Reason described a safety culture as one that:

- Supports open reporting;
- Is a just culture where it is clear what behavior is acceptable or not;
- Is flexible, adapting to changing threats; and
- Supports learning (and by extension improvement).

In his report on the loss of a military aircraft, Charles Haddon-Cave QC suggested adding a fifth facet that of a questioning culture. Other researchers have suggested 'mindfulness' of hazards or 'chronic unease' as other considerations.

Here safety leadership is used to represent the actions that motivate and influence the behavior of others (rather than indicating hierarchal status). Hence safety leadership is seen as an important method of influencing culture.

Safety leadership can be exhibited at all levels in the organization, but it is the safety leadership of middle and senior management that is most critical when assessing an organization. Having a stated corporate safety vision or policy that encompasses safety culture is necessary, the cultural reality may still have to mature to reach that vision. How the company is striving to enhance its culture is critical.

Auditors should take care not to draw excessive conclusions from isolated individual behavior or superficial secondary indicators of behavior. Culture is a collective characteristic and so it is important to recognize what is typical, not what is atypical. Equal care should be taken not to confuse signs of safety management activity with leadership or culture. While a well-organized SMS may indicate an effective safety culture a well structure safety process does not guarantee full engagement. Similarly, a desired culture is not the same as the actual culture.

ORG 3.10.03
ORG 3.13.01
ORG 3.13.02
ORG 3.13.03

Findings made in this area should relate to constructive and achievable near-term objectives. Care should be taken by auditors to ensure that SMS process matters are dealt with under Common Control 1.13. Common Control 1.1 is an overarching Common Control for 1.2 and 1.13.

evidence



Interview of key personnel and observation of operations.

Consider how the organization set outs behavioral and cultural expectations. Are those expectations clearly communicated, widely understood, accepted and respected?

Consider how the management engages with the workforce. Do they communicate solely by e-mail, memo and notice or do they also engage face to face in meetings and management visits? Are safety messages clear? In large organizations do senior managers use video messages to provide a more human face to their communication? Are there opportunities for two way communication? Can management show they listen? Do they display passion for safety or is it 'just another' issue? Are employees regularly surveyed for their opinions on safety? If so, how is that feedback used?

Consider how the organization develops safety leadership skills in key personnel. Are senior managers role models for safety leadership? Consider how the organization rewards safety leadership, participation in safety activities and other safety contributions. Are employees empowered to intervene on operational safety matters regardless of their position in the organization?

Consider how strongly the organization cares about safety. Is there pride to deliver safe operations?

Other References:

Managing the Risks of Organizational Accidents, James Reason (Ashgate) 1997

Organizational Culture and Leadership, Edgar Schein (Jossey-Bass) 5th Edition 2018

Beyond SMS, AeroSafety World, May 2008

Nimrod Review, Charles Haddon-Cave QC (HMSO) 2009

ICAO Safety Management Manual

1.2: Safety Intelligence

Ensuring a collaborative approach to sharing safety information to directly benefit the entire industry and all stakeholders.

Aircraft operators must actively participate in relevant industry safety bodies and initiatives. Operators must share safety occurrences using the locally applicable mandatory and voluntary safety reporting schemes. The Operator must promptly advise the company of any incident, accident or non-standard occurrence related to the services provided to the company that has, or potentially could have, disrupted operations or jeopardized safety, and include any corrective or preventative actions being taken. Operators must examine available external occurrence reports, accident reports and safety promotion material and identify relevant lessons and necessary internal actions.

ORG 3.02.06

ORG 3.03.03

ORG 3.05.02

Safety intelligence about the aircraft operator will be produced by its own SMS (Common Control 1.13). This Common Control is focused on gathering intelligence from outside the organization and collaboratively helping spread Safety Intelligence wider in the industry. Typical industry safety bodies that Operators could participate in include (but are not limited to) local flight safety committees, industry associations or professional bodies, regulatory rule making teams and the Flight Safety Foundation. While there are practical limits to how much any Operator can participate in, it is expected that the Operator can articulate which groups they support, how and why.

Operators are expected to be able to demonstrate that they meet mandatory and contracted reporting requirements and show that, subject to local privacy and confidentiality requirements, they are voluntarily sharing information (both to help raise awareness across the industry but also to encourage others to share information). There are limits to how many outside reports an Operator, especially a small one, can study. It is expected an Operator will be able to demonstrate they are aware of the majority of the most recent and relevant accidents and serious incidents involving the types they use or their area of operation that have been documented in the public domain. It is expected they have analyzed the most significant to identify any opportunities for improvement. Care should be taken by auditors to ensure that SMS process matters are dealt with under Common Control 1.13. Common Control 1.1 is an overarching Common Control for 1.2 and 1.13.



The aircraft operator needs to demonstrate that their SMS is more comprehensive than simply internal policies and procedures. Evidence could include; being an active member of relevant industry safety bodies; having a process for monitoring external safety and occurrence information; and sharing safety reports (as appropriate) with external agencies.

1.3: Approved Aircraft Operator

Ensuring use of licenced and approved aircraft operators only.

Use only licenced aircraft operators who have been approved for use by a company established process and where necessary, 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.



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.

1.4: Flight Crew Qualifications, Experience and Recency

Ensuring flight crew are competent to fulfill their duties by having appropriate training, qualifications and experience.

Flight crew must meet the requirements listed in Appendix 1.

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. Specific detail on each of CBT options can be found in the BARS Implementation Guidelines.

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 Annex B 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

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

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 responsible 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.

1.5: Flight Crew Check and Training

Ensuring flight crew continue to remain competent and appropriately trained and are familiar with the operating environment.

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 responsible 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.

FLT 1.05.02
FLT 2.03.02
FLT 2.03.16
FLT 2.03.19

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).

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 responsible 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.



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.



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.

1.6: Maintenance Personnel Qualification

Ensuring maintenance personnel are competent to fulfill their duties by having appropriate training, qualifications and experience.

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

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.



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.



1.7: Maintenance Training

Ensuring maintenance personnel continue to remain competent and appropriately trained.

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.

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.

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

1.8: Basic Aircraft Equipment Fit

Ensuring aircraft are fitted with the required minimum level of equipment suitable for the intended operations.

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

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.

MNT 3.01.01
MNT 3.01.02
MNT 3.01.03
MNT 3.01.04
MNT 3.01.06

1.9: Personnel Readiness

FLT 1.02.13
FLT 1.02.22

Ensuring mental health and well-being for all personnel is prioritized and assistance made available to assure fitness-for-work.

WELL-BEING POLICY

The aircraft operator must have a Wellbeing Policy and associated procedures that encourages personal wellbeing and resilience, while minimizing the risk of physical or mental health conditions developing into a safety concern for the individual or those around them.

Aircraft operators should facilitate personal wellbeing and resilience, while having safety nets to address physical and mental conditions that affect safety of the individual and those around them. Aircraft operators should encourage confidential non-punitive self-reporting and clearly articulate expectations of personnel treatment considerations, access to peer-support/counselling, employee assistance and pilot loss-of-licence insurance. Medicals and health surveillance should be appropriate to the role and exposure of individuals. Specific local regulatory requirements and limitations should be addressed.

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.



Aircraft operators should have a documented policy regarding the maintenance of good health, both physical and mental, of all their staff. The policy should be implemented via detailed procedures, supported by appropriate records of their application.

Evidence could include: company manuals; personnel files; meeting minutes; membership certificates and other records.

Other References:

MUK CAA Paper 2002/06 Work Hours of Aircraft Maintenance Personnel

FSF/ICAO/IFALPA/IFHA Fatigue Management Guide for Helicopter Operators

An Aviation Professional's Guide to Wellbeing, Flight Safety Foundation

Skybrary Hindsight 30 'Wellbeing' issue, April 2020

Flight Safety Foundation – The Keil Centre Personal Resilience Program



1.10: Flight Time Limits

Ensuring flight crew are alert and fit-to-fly the aircraft.

Apply the following flight time limits unless the responsible regulatory authority's requirements are more stringent:

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

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

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.

FLT 1.04.01
FLT 1.04.02
FLT 1.04.03
FLT 1.04.04
FLT 1.05.04

1.11: Flight Crew Duty Time

Ensuring flight crew are not impacted by fatigue.

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.

evidence



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.

FLT 1.04.02
FLT 1.04.03
FLT 1.04.04

1.12: Maintenance Duty Time

MNT 1.07.02
MNT 1.07.03
MNT 1.07.04

Ensuring maintenance personnel are not impacted by fatigue.

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.



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

1.13: Aircraft Operator Safety Management System

Ensuring Safety Management Systems are effective at gathering and analyzing safety information, managing risk, providing assurance and ensuring continuous improvement.

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

The operators Safety Management System must meet the requirements of the relevant national aviation authority (as applicable) or at least the ICAO Doc 9859 SMM components and elements of:

Safety Policy and Objectives

- Management and Commitment;
- Safety accountability and responsibilities;
- Appointment of key safety personnel;
- Coordination of emergency response planning;
- SMS documentation;

Safety Risk Management

- Hazard identification;
- Safety risk assessment and mitigation;

Safety Assurance

- Safety performance monitoring and measurement;
- The management of change;
- Continuous improvement of the SMS;

Safety Promotion:

- Training and education;
- Safety communication.

The operator must ensure the SMS applies to all departments and location/bases where operations are performed.

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
ORG 3.02.05
ORG 3.02.06
ORG 3.03.01
ORG 3.03.02
ORG 3.03.03
ORG 3.04.01
ORG 3.04.02
ORG 3.05.01
ORG 3.05.02
ORG 3.06.01
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

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.

1.14: Accident and Incident Notification

ORG 3.06.03

Ensuring all events that impact safety or have the potential to impact safety, are reported appropriately.

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.



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.

1.15: Operational Risk Assessment

ORG 3.04.03

ORG 3.04.04

ORG 3.04.05

ORG 3.04.06

Ensuring all risks associated with aircraft operations are analyzed, minimized and accepted.

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.



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.

1.16: Sub-chartering Aircraft

Ensuring sub-chartered aircraft are operated in accordance with regulatory approvals and to a standard acceptable by the contracting company.

ORG 1.02.02

ORG 1.02.05

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.

evidence



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

Ensuring the physical design of airfields and helicopter landing sites, their markings, lighting, emergency cover and all ancillary systems are suitable for safe operations.

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) Annex D provides additional guidance for short-term or emergency use airfields whilst Annex 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.



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

Ensuring airfields are appropriately maintained to assure safe operations.

In addition to reviews required by regulators, all company owned and/or operated airfields must have an annual operational 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

Ensuring effective risk assessment of landing sites to enable safe operations.

Aircraft operators must conduct landing site assessments prior to commencing operations. Incorporate the results into the operational risk assessment (Control 1.14).

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.



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

Ensuring airfields are suitable for operations, including in the event of aircraft engine malfunctions.

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.

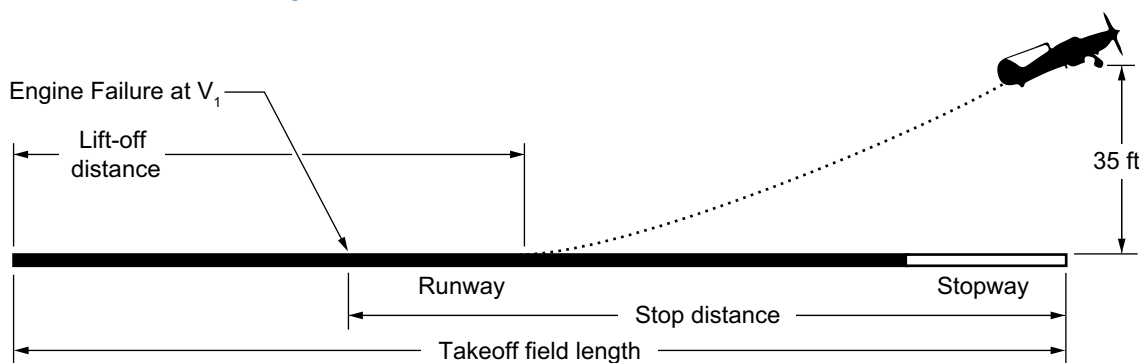


Figure 4: Balanced Field Length

evidence



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

Ensuring that in the absence of aircraft performance information, airfields remain suitable for operations including in the event of aircraft engine malfunctions.

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.



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

Ensuring flight crew receive accurate actual and forecast weather data to enable sound planning decisions.

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;
- Barometric pressure; and
- Temperature;
- 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

Ensuring safety enhancement during the approach and landing phases of flight through the provision of accurate glideslope guidance to flight crew.

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.



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.

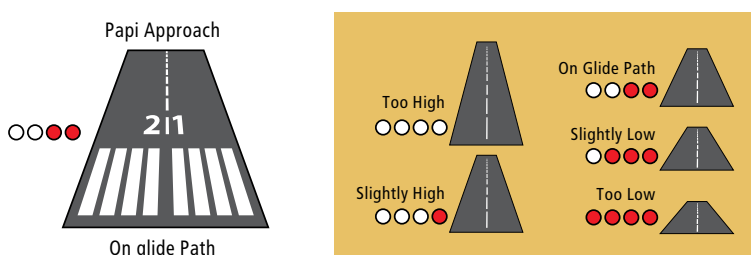


Figure 6: PAPI Lights – use of red and white provides glideslope indication

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 contracted 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

Ensuring aircraft depart with sufficient fuel on-board to safely conduct the flight.

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 and during each flight stage.

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.



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 preflight and in-flight fuel checking and monitoring has been conducted.

3.2: Flight Plan Weather Data

FLT 1.06.01
FLT 1.06.04

Ensuring accurate weather data is used when calculating aircraft routes and fuel requirements.

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



The aircraft operator must document a description of minimum expectations associated with weather forecast review used in support of preflight 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

Ensuring flights are subject to appropriate planning and highest possible notification requirements.

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 responsible 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

Ensuring sufficient fuel, including required reserves, is carried on IFR flights.

Fuel loads must cover:

- *Trip fuel sufficient to cover fuel use during start-up, taxi, en route, holding, approach and transit to the alternate destination (if required);*
- *30 minutes fixed reserve fuel; and*
- *Variable reserve fuel amounting to the higher amount of:*
 - *10% of trip fuel to account for unforeseen circumstances; or*
 - *5% of trip fuel plus contingency fuel to permit unpressurised or engine out operations at drift down altitude to the destination or alternate.*

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.

FLT 1.07.01
FLT 1.07.02
FLT 1.07.03
FLT 1.07.04
FLT 1.07.05

3.5: Visual Flight Rules (VFR) Fuel Plan

Ensuring sufficient fuel, including required reserves, is carried on VFR flights.

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.



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

Ensuring hot refueling operations are used appropriately and conducted safely.

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.

evidence



Where hot refueling 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.



Courtesy: Skyhorse Aviation

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

Ensuring the fuel on-board prior to flight is the correct type and grade and free of contamination.

FLT 1.08.01

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.

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 preflight 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

Ensuring the quality of the fuel dispensed to aircraft is acceptable.

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 least annually or at nominated pressure differentials as annotated on the filter housing or as recommended by the manufacturer.

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.

The aircraft operator's oversight 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 nonconformance/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.

4.3: Fuel Sampling

Ensuring samples of tested fuel are retained appropriately.

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 preflight 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 preflight 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

Ensuring fuel is stored in a manner that will prevent contamination.

Prior to testing and approving 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. 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.



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

Ensuring drummed fuel is handled in a manner that will not compromise fuel quality.

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;*
- *Before fueling the aircraft, a small amount of fuel must be pumped into a container to remove any contaminants from the hose and nozzle; and*
- *All drum pumps, spears, and hoses must be sealed when not in use to protect from ingress of dust and contaminants. Seals must be non-porous and secure.*

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.



The aircraft operator's SOPs and maintenance documentation should detail the requirements and/or procedures that must apply as part of the preflight 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

5.1: Two-Crew Operations

FLT 1.05.05
FLT 1.13.15

Ensuring effective and safe operations in night and IFR conditions and when risk assessed for Day VFR.

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).

Where the requirement for two pilots in passenger-carrying Day VFR operations is risk-assessed by the BMO as being necessary for aircraft certificated and normally flown single pilot, the following must be satisfied:

- *The aircraft is fitted with dual controls,*
- *The aircraft operator and pilots have a clear understanding of the role of the second 'Safety Pilot'.*

Where the requirement for two-pilots in passenger-carrying Day VFR operations is risk-assessed by the BMO as being necessary for aircraft certificated and normally flown single-pilot, the following must be satisfied:

- The aircraft is fitted with dual controls; and
- The aircraft operator and pilots have a clear understanding of the role of the second 'Safety Pilot'.

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.

When an aircraft operator is a single-pilot Day VFR operation and two-pilots are requested by the BMO, the second pilot is understood to be operating in the role of 'Safety Pilot'. The aircraft operator and flight crew understand and acknowledge the Safety Pilot is not to perform any flight management responsibilities, and the aircraft is to be operated single-pilot throughout all phases of flight. The Safety Pilot need only meet the minimum requirements outlined in Appendix 1 Co-Pilot minimum experience and recency requirements.

Furthermore, the aircraft operator should be required to address the requirements outlined in the following table when preparing the Operational Risk Assessment (ORA) prior to any flight (or series of flights) undertaken.

Table 1: Safety Pilot versus Two-Crew Procedures

Safety Pilot versus Two-Crew Procedure (When two-pilots are required for Day VFR passenger carrying operations)	Operator Response
1. Do you have two-crew procedures for the aircraft type documented in your Company Operations Manual?	Yes/No
a. If yes – conduct activity using two-crew procedures meeting all BARS requirements	
b. If no – address the following in the ORA process	
(i) The second pilot meets the minimum experience requirements as outlined for co-pilot in latest version of BARS Appendix 1	Yes/No
(ii) The second pilot is to be considered a 'Safety Pilot' and not considered part of a working two-crew complement	Yes/No
(iii) Operator and flight crew acknowledge Safety Pilot is not to perform any flight management responsibilities and the aircraft is to be operated single-pilot throughout all phases of flight	Yes/No
(iv) Operator and flight crew acknowledges primary purpose of the Safety Pilot is to act in event of pilot incapacitation, provide secondary opinion towards in-flight management and assist in the management of emplaning and deplaning personnel.	Yes/No

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: Night or IFR – Aircraft

Ensuring safety and redundancy for night and IFR flights.

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.

| 5.3: Night or IFR – Flight Planning

FLT 1.02.14

Ensuring appropriate planning for the safety of night or IFR flights.

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

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.



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.

| 5.4: Night or IFR – Simulator Training

FLT 2.04.01

Ensuring high quality training of flight crew in a benign environment.

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.



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.

| 5.5: Night or IFR – Approach/Landing Recency

FLT 2.06.02

Ensuring that flight crew have appropriate recent experience for safe night and IFR operations.

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.

| 5.6: Night or IFR – Autopilot

FLT 1.02.16

Ensuring the maintenance of controlled flight is enhanced by the use of automation.

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.

| 5.7: Stabilized Approaches

FLT 1.02.04

FLT 1.13.19

Ensuring that all approaches are within recognized predefined safety margins.

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).

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 helicopter landing site reconnaissance, wind assessment and approach techniques involving in ground effect and out of ground effect considerations. Note that an approach that exceeds these parameters may not necessarily require an immediate go-around, but rather the aircraft must be established within the parameters prior to the final stages of the approach and landing.

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.



The aircraft operator must document a clear policy regarding the criteria to be met, guidance and requirements for the conduct of stabilized approach. Helicopter operators should provide clear guidance for parameters to be met prior to continuing final approach and landing, e.g. into wind, rate of descent and ground speed under control.

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.

| 5.8: Mandatory Go-around Procedures

Ensuring safe outcomes for unstabilized approaches.

FLT 1.02.05

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

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 a clear policy regarding the criteria to be met, guidance and requirements for the conduct of stabilized approach. Helicopter operators should provide clear guidance for parameters to be met prior to continuing final approach and landing, e.g. into wind, rate of descent and ground speed under control.

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.

| 5.9: Terrain Awareness Warning System (TAWS)

FLT 1.11.01
FLT 2.03.14

Ensuring the accurate detection of terrain and adjacent obstacles so as to allow timely corrective action if necessary.

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

Ensuring the maintenance of controlled flight with, or without, the use of automation.

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.



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

Ensuring clearly defined procedures for the safe conduct of multi-crew operations.

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.



 FLT 1.02.01

FLT 1.02.02

FLT 1.02.03

 FLT 1.13.15



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.

Other References:

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

Ensuring flight crew are trained and proficient in the effective use of all resources for the safe conduct of flight.

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.

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.

FLT 2.02.01

FLT 2.02.02

FLT 2.06.04



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

FLT 1.02.15

Provision of accurate and timely feedback to flight crew via a monitoring program.

When available for the aircraft type, designated aircraft on long-term contracts must have Flight Data Monitoring capability routinely used to assess operational performance.

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.



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.

Other References:

UK CAA CAP739 Flight Data Monitoring

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

6.5: Line Operations Safety Audit (LOSA)

Provision of a feedback system to the company of the effectiveness of the CRM, training program and TEM capabilities of the pilot population in their operating environment.

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 enough data to provide a statistically valid sample of the operation is being collected and 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.

Other References:

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

ICAO Doc 9803 – Line Operations Safety Audit

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

6.6: Electronic Flight Bags (EFB)

FLT 1.13.24

Ensuring use of EFBs is conducted in a safe manner that positively contributes to the overall management of the flight.

If the aircraft operator makes use of EFBs in the cockpit, a Standard Operating Procedure covering all intended applications and any safety-related restrictions must be developed and approved in accordance with ICAO Doc 10020 manual of Electronic Flight Bags (EFBs) or local regulatory equivalent (such as Advisory Circular AC 120-76D) for the EFB type being used.

An electronic flight bag (EFB) is an electronic information management device that helps flight crews perform flight management tasks more easily and efficiently with less paper. It provides the reference material often found in the pilot's carry-on flight bag, including the flight-crew operating manual and navigational charts. In addition, the EFB can host purpose-built software applications to automate other functions normally conducted by hand, such as takeoff performance calculations.

There are various classes of EFB hardware and these should be seen as part of an EFB system, in which the effectiveness of the hardware function is assured by its place in that system. The EFB 'system' includes power and data connectivity, installation mounts and software applications/updates.



The Operator should have documented policy and Standard Operating Procedures (SOPs) supported by appropriate records of their application.

SOPs should cover the use of EFB hardware and EFB applications in the aircraft. These procedures must define the roles the flight crew member, cabin crew, and dispatch/flight following, including but not limited to:

- Procedures defining expectations of how the flight crew member must use each EFB application during ground operations and under all flight conditions;
- Procedures defining how the flight crew member will report irregularities of EFB hardware or EFB applications and modify those existing policies and procedures based on flight crew member feedback; and
- Procedures for normal, abnormal, and emergency use to flight crew members.

6.7: Fire Containment Bag

Ensuring an in-flight lithium battery fire generated inside the cockpit or cabin is contained before combustion results in loss of control.

If any Personal Electronic Devices (PEDs) or Electronic Flight Bags (EFBs) are carried in the cockpit or cabin, a Fire Containment Bag must be accessible in-flight. The Fire Containment Bag must be of sufficient size to cater for the largest item carried, and all crew members, including cabin attendants, must have received training in the safe capture of burning devices using the bag.

Fire-containment bags are purpose made devices made of a fire-resistant material and are designed to hold electronic devices such as mobile phones and laptops that have overheated or caught fire. They can be sealed and withstand extreme temperatures.

There are a number of different types of fire containment bags on the market and there are varying parameters in terms of design. Aircraft operators should have appropriate SOPs for the use of the apparatus.

It should be noted that some aircraft operators already have SOPs for safely dealing with in-flight fires caused by PEDs and have decided not to add Fire Containment Bags to their inventory.

evidence



The aircraft operator should have documented policy and procedures supported by appropriate records of their application. SOPs should include training of all flight crew and cabin crew as applicable.

Courtesy: Nautilus Aviation



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

Ensuring accurate passenger weights are utilized in load calculations, appropriate to the type of aircraft.

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 responsible 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).



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 responsible 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

Ensuring aircraft loads are accurately weighed, manifested, appropriately positioned and secured.

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.

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.

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.



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

Ensuring accurate and safe aircraft loading within approved limits.

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

Ensuring accurate passenger manifests are appropriately retained.

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.

 GRH 1.01.02

 GRH 1.01.07



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.

7.5: Dangerous Goods Cargo (Hazardous Materials)

FLT 1.02.06
FLT 2.03.11
FLT 2.03.12
FLT 2.06.04
FLT 2.06.05
GRH 1.03.01
GRH 1.03.02
GRH 1.03.03
GRH 1.03.04
ORG 1.02.04

Ensuring only appropriately packaged and documented DG is carried in aircraft and is handled by trained and current personnel.

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.



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

Ensuring passengers have the necessary knowledge to safely board, disembark and evacuate the aircraft in all situations.

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; and*
- *Instructions on the use of Personal Electronic Devices (PEDs).*

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 preflight 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 preflight 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.

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

7.7: Multi-language Briefing

FLT 1.09.10

Ensuring that all passengers fully comprehend the safety briefings and safety features of the aircraft.

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 preflight 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.



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

Ensuring aircraft passengers are safe and secure when not embarked in the aircraft.

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

Ensuring aircraft cargo is kept safe and secure prior to loading.

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

Ensuring passengers are kept clear of known hazard areas during embarkation and disembarkation.

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

Ensuring safe maneuvering of aircraft when on the ground.

GRH 1.01.01

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

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.



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

Ensuring safety of all personnel in the vicinity of aircraft under power on the ground.

FLT 1.03.07

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.

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).



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

Ensuring the physical characteristics of the parking apron support safe aircraft operations and deconflict aircraft movements.

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.



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

Ensuring security of airfields and landing areas.

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

Ensuring airfields are operated in accordance with certification requirements by qualified personnel.

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.

Other References:

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.**

9.0: 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.

9.1: Cruising Altitudes

Ensuring appropriate vertical clearance from other aircraft and known bird activity.

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: Air Traffic Control (ATC) Oversight

Ensuring the optimum use of ATC services to maximize air traffic separation.

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

Ensuring that the probability of bird strikes to aircraft in the vicinity of airfields is minimized.

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)

Ensuring timely detection of conflicting air traffic to enable correct avoidance maneuvers and avoidance of other traffic.

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.

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.

FLT 1.11.02

FLT 2.03.14



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

MNT 3.01.03

Ensuring aircraft are conspicuous to all other traffic.

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 when approved for the aircraft type.

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.



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.



Courtesy: Skyhorse Aviation

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

Ensuring the safety of occupants in the event of engine failure and subsequent forced landing.

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

Ensuring the safety of occupants in the event of engine failure.

Multi-engine aircraft capable of sustaining a 1% net climb gradient above the route lowest safe altitude, or 500 feet above the terrain in the area of operations, with One Engine Inoperative (OEI), 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 over water flights.

10.3: Supply of Spares

Ensuring the provision of genuine, serviceable parts.

The aircraft operator must ensure that all parts accepted into stores and fitted to an aircraft conform to approved design data, had been released by an appropriate organization, are suitably stored and are in a condition for safe operation.

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.

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

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 approval(s) 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

Ensuring facilities are conducive to sound maintenance practice, including the provision of emergency equipment.

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.



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

Ensuring the early detection of impending failures in helicopter transmission systems to facilitate timely corrective action.

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.

evidence



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

Ensuring the early detection of impending failures in engine systems to facilitate timely corrective action.

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.

evidence



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)

Ensuring clear guidance for the safe operation of the aircraft with inoperative equipment prior to dispatch by use of approved procedures.

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 exist 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

Ensuring clear warning of aircraft pressurization failure.

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

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
MNT 2.06.03

MNT 3.01.04

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

Ensuring maintenance tasks that are critical to the safety of flight are managed with additional independent scrutiny.

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 preflight 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

Establishing weather limitations consistent with the capabilities of the aircraft and the available rescue assets, are applied to each flight.

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.

11.2: Thunderstorm Avoidance

Ensuring safe operations in the vicinity of thunderstorms.

FLT 1.10.01

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.



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

Ensuring flight crew are provided with accurate real-time weather information to allow the avoidance of adverse conditions.

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.

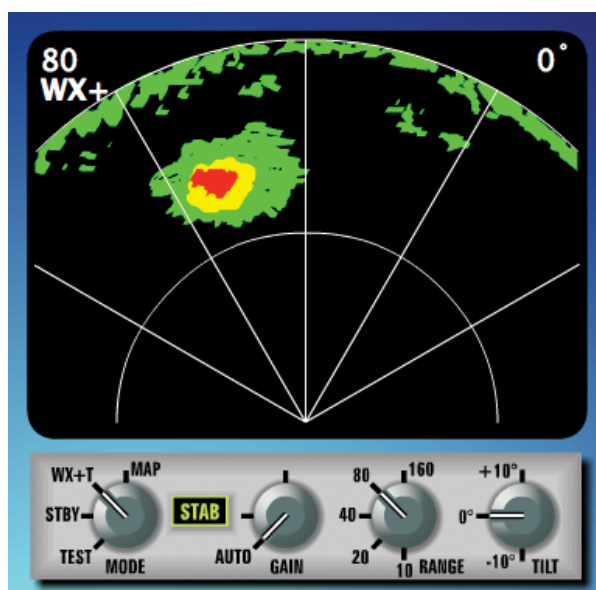
evidence



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

Ensuring flight crew are provided with regular training to enable safe operations in the event of wind shear phenomenon.

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.

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.

Other References:

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

11.5: VFR Minimum Requirements

FLT 1.03.05

Ensuring aircraft are operated safely when utilizing Visual Flight Rules especially in dynamic or marginal environments.

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.



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

Ensuring flight crew are appropriately trained for the safe operation of aircraft in cold weather environments.

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/>).

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.

Some state authorities have introduced regulations to prohibit persons from conducting or attempting to conduct a takeoff in an aircraft that has frost, ice or snow adhering to any of its critical surfaces such as wings and propellers. That is, if the Pilot-in-Command (PIC) cannot confirm that the aircraft is “clean”, takeoff must not be attempted until confirmation is obtained that the aircraft is free of frozen contaminants. This is called the ‘Clean Aircraft Concept.’

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.



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. Ideally, the operator would implement the ‘Clean Aircraft Concept.’

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.

11.7: Mountain Flying Training (Helicopters)

Ensuring helicopter Flight Crew have sufficient training when operating in a mountainous environment.

Helicopter operators must ensure any pilot operating in a mountainous area has completed a mountain flying course to the satisfaction of the Head of Flight Operations. The course must meet or exceed both the ground and flying syllabus outlined in the Helicopter Association of Canada Mountain Flying Training Best Practice version 1.1 dated August 2012.

Flying in mountainous regions brings with it a number of unique challenges. Mountains create flight in disturbed air which is further impacted by such parameters as altitude, elevation of the mountains, temperature and irregular surfaces. The Helicopter Association of Canada – Mountain Flying Training Practices provides 'best practice' guidance for helicopter operators developing and maintaining their respective training programs for mountain flying.

Individual operators retain responsibility for tailoring their company policies to the experience and aptitude of individual pilots, the type of equipment operated, the prevailing geographic and climatic conditions of the local operating environment and other particulars, specific to each Operator.

Ideally, the training syllabus should include the following:

- Wind;
- Weather;
- Aircraft Performance;
- Topography;
- Reconnaissance;
- Mountain Approach;
- Mountain Departure;
- Rejected Landings;
- Reference Management;
- Airmanship; and
- Loss of Tail Rotor Effectiveness.



The aircraft operator should have documented Mountain Flying Training policy and procedures supported by appropriate training records. Pilot training files of pilots involved in flying in mountainous environments should show evidence of successfully completing appropriate mountain flying training.



Courtesy: Ecocopter

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 type of aircraft 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 resourced.

Where possible medevac should be undertaken by dedicated medevac suppliers/operators with properly certified medically configured aircraft.

12.1: Securing of Medical Equipment

Ensuring role equipment is secured appropriately in the aircraft.

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

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 staff/crew/organization must have procedures to provide the operator/flight crew details of any non-standard medical equipment to be carried. Medical staff/crew 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.



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

Ensuring role equipment is accounted for in the weight and balance calculations.

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 staff/crew/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 staff/crew and portable medical equipment must be checked by 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.



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

Ensuring preflight planning and aircraft systems provide the maximum possible level of care to patients.

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

For aircraft such as helicopters that do not have a pressurized cabin, there may be additional planning considerations for medical transfers. Operation at low altitudes may be the only option to deal with the medical emergency being experienced. This introduces complexities with planning due to considerations such as terrain avoidance, additional track miles and communications.

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

The flight crew must discuss with the medical staff/crew/organization any operating limitations for potential negative impact on the patient. This includes consideration of acceptable cabin altitudes and/or rates if climb.

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 cabin altitude.



The aircraft operator's Operations Manual must contain documented policies and procedures regarding medevac operations where the patient's medical condition requires the altitude of the aircraft cabin to be maintained at that equivalent to sea level. Helicopter operators should provide guidance regarding low altitude medical transfers.

The flight planning process for a medevac flight should pay particular attention to:

- Minimum safe altitudes applicable for non-direct tracking flight routes;
- Fuel consumption for non-optimal altitude operations;
- Flight planning notification for medevac operations;
- Airspace management and avoidance for non-optimal operations; and
- Communications limitations (reduced range or interference/blockages and low or non-optimal routings).

12.4: Communications

FLT 4.01.03

Ensuring clear communications between flight crew and medical staff in the aircraft.

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.

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 staff/crew and flight crew.

Flight crews must carry out a preflight briefing with the medical staff/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 staff/crew;
- The loading and unloading methodology of the patient;
- The intended use of the stretcher system and mobile medical equipment;
- Management of in-flight emergencies;
- Seatbelt use – Medical staff/crew to advise crew if seatbelts need to be unfastened in-flight; and
- Seating configuration – identify most suitable seating of medical staff/crew for patient access.



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

ORG 3.04.07

12.5: Risk Assessment

Ensuring safety of flight is the prime consideration prior to dispatch on medevac or SAR operations.

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.

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 situation. The company should recognize and support this process.

Contracting companies/medical organizations should consider regular drills involving the aircraft operator and medical staff/crew 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.



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.

MNT 5.01.01

12.6: Equipment Documentation

Ensuring medevac equipment is appropriately certified for use.

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 equipment to the aircraft for medical use must be carried out in accordance with all applicable airworthiness requirements of the responsible regulatory authority.



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

Ensuring early detection of impending failure of medical equipment.

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 equipment for medical use 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.



Equipment installed in this manner, generally being certified stretcher systems, medical walls, with gas and electrical supply, for attaching carry on medical equipment requiring STC or equivalent must be considered as any other aircraft part and be included into the aircraft maintenance program and management policies and procedures.

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 equipment for medical use 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

Ensuring patient oxygen systems are properly certified and tested.

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 medical 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 in collaboration with the medical staff/crew/organization. Oxygen supplier details to be kept on record, with phone numbers to be kept available for out of hours requests.

Any medical oxygen cylinder that is dropped must be removed from use and sent for hydrostatic testing and internal visual inspection before being returned to service.



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

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

The use of light weight aviation certified medical oxygen cylinders is recommended where possible.

12.9: Flight Crew Qualifications, Experience and Recency

Ensuring flight crew are competent to conduct medevac operations by having appropriate training, qualifications and experience.

FLT 2.01.01

Comply with the requirements listed in Appendix 1.

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.



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

Ensuring protection of personnel on-board the aircraft from exposure to contaminated surfaces.

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 trained/briefed on the hazards posed by leftover medical waste by medical staff/crew and assisted/supervised by the medical staff/crew/organization.

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 staff/crew is responsible for wiping down any medical equipment and areas of possible patient contact or other contamination. This should be performed after each flight mission with an appropriate disinfectant and/or cleaning agents approved for use in the aircraft.

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 by the medical staff/crew. 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 by the Operator and medical staff/crew/organization.

Medical staff/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 by medical staff/crew. 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 staff/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 staff/crew. This will assess the effectiveness of the cleaning procedure.

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

Health authorities need to be informed by the medical staff/crew/organisation of any patient transported with a highly infectious or 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 or medical organization has been granted.

Where the use of portable isolation measures or patient Isolation Units are required, flight crew, medical staff/crew and ground staff need specific training in their use and coordination of medevac missions. Such training should include a practice schedule using these isolation devices.



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. This cleaning and infection control policy should be included in the Operators Operations Manual. The use of isolation devices and training requirements/frequency of training should be documented in the Operators Operations Manual.

12.11: Arrival at Destination (Destination Arrival or Transit Planning)

Ensuring ground services are ready and capable for onward transport of the patient(s).

FLT 4.01.06

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.

The destination arrival procedures must be carefully planned and coordinated with the aircraft operator, ground handler, any ground transport and medical staff/crew/organization, 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.

Ground or other 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. There should be a designated handover point identified as a safe but practical distance from the Operators aircraft. 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

19.0: 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.

19.1: Aircraft Certification Standards

Ensuring the aircraft crashworthiness capability is appropriate.

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.

19.2: Emergency Response Plan

Ensuring adequate and appropriate SAR or emergency response procedures are up to date and tested.

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.



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.

19.3: Emergency Locator Transmitter

MNT 3.03.01

MNT 3.03.02

Ensuring timely alerting and location identification to aid SAR services.

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 is also to 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.



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.

19.4: Satellite Flight Following

FLT 1.12.01

FLT 2.07.02

Ensuring that the location of aircraft during normal and emergency situations is known at all times.

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.



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.

19.5: Flight Following

Ensuring that the location of aircraft during normal and emergency situations is known, even when not subject to air traffic control procedures.

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.

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.

FLT 1.12.02

FLT 2.07.01

FLT 2.07.02



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.

19.6: Survival Kit

Ensuring that in the event of an emergency, aircraft occupants have access to suitable equipment and supplies to aid survival in the geographical environment.

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.

19.7: Flight Crew PLB

FLT 5.04.03

Ensuring timely alerting and location identification to aid SAR services.

Flight Crew operating helicopters in hostile environments must have access to a Personal Locator Beacon (PLB) that is either voice-capable or is accompanied with a satellite phone.

The requirement for helicopter flight crew to have a PLB that is either voice-capable, or accompanied by satellite phone, as a mitigation control 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.

evidence



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.



Crew change – Western Australia

19.8: First-Aid Kit

MNT 3.03.04

Ensuring that in the event of an emergency, aircraft occupants have access to medical equipment.

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

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.

19.9: Passenger Dress Requirements

Ensuring that passengers wear protective clothing appropriate to the operating conditions and environment.

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.

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

Ensuring appropriate equipment is fitted to an aircraft to aid in accident investigation and prevention.

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.



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.

19.11: Upper Torso Restraint

Ensuring aircraft occupants survive a crash impact.

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

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.



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 preflight safety briefing.

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

19.12: Limitations in Sideways Seating

Ensuring aircraft occupants survive a crash impact.

Sideways 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.

 FLT 1.09.09

 FLT 1.13.11



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.

19.13: Crash Boxes

Ensuring that in the event of an accident, emergency response teams have access to suitable equipment.

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.



19.14: First Response to Aircraft Incident on Airfield

Ensuring adequate 'rapid' emergency response is available on the airfield in a timely and adequately resourced manner.

All company owned or operated helipads or airfields must have an onsite means of providing an first response capability commensurate with the potential risk. The first response capability is aimed at suppressing development of fire to allow personnel time to exit the aircraft. 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.



19.15: Insurance

ORG 2.02.01

Ensuring business continuity for the contracted providers.

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.



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

19.16: Post Event Management

ORG 3.06.04

Ensuring post-event protocols are established to assist safe resumption of activities.

The aircraft operator must have a process clearly outlining a safe resumption of services following a reportable event. This process should include (but not be limited to), ensuring flight crew well being and fitness-for-work, aircraft continuing airworthiness assurance and any role-specific activities (such as external loads) are all being conducted in accordance with expectations.

An important phase of any accident or incident is the action taken after the initial response to the event. Aircraft operators need to have processes in place to ensure the safe resumption of their usual services.

Issues to be considered include:

Physical and mental well-being of staff and/or flight crews;

Continuing airworthiness of the aircraft fleet; and

Ability to continue specialist services.



The aircraft operator should have documented policy and procedures explaining the requirements for post event management. Evidence could include records from Emergency Response Plans and/or Management of Change planning.



Courtesy: Skyhorse Aviation

Appendices

Appendix 1: Flight Crew Qualifications, Experience and Recency

Pilot-in-Command – Aeroplanes and Helicopters

Qualifications	>5700 kg Multi-engine	5700 kg and below Multi-engine ⁽¹⁾	Single-engine
Licence	ATPL	CPL ⁽⁵⁾	CPL
Instrument Rating ⁽²⁾	Command, multi-engine	Command, multi-engine	Not required
Experience⁽³⁾			
Total Hours	3000	2500	2000
Total Command	2500	1500	1500
Total Command Multi-engine	500	500	N/A
Total Command on Type	100	100	100
Experience in Topographical Area	One year experience in area similar to specified in contract (arctic, offshore, high density altitude mountainous, jungle, international operations, etc).		

Co-pilot – Aeroplanes and Helicopters

Qualifications	>5700 kg Multi-engine	5700 kg and below Multi-engine ⁽¹⁾	Single-engine
Licence	CPL	CPL	CPL
Instrument Rating ⁽²⁾	Command	Co-pilot	
Experience⁽³⁾			
Total Hours	500	250	250
Total Multi-engine	100	50	
Total on Type	50	10	10

Both Pilot-in-Command and Co-pilot – Aeroplanes and Helicopters

Recency	
Total Hours previous 90 days ⁽⁴⁾	50 hours, ten on the aircraft type
Night recency previous 90 days	Three night takeoffs and landings
CRM/ADM initial and refresher	Every two years
Dangerous Goods Awareness	Every two years
Accident and Violation Record	Two years accident free for human error causes, subject to review by the company

Maintenance Personnel – Aeroplanes and Helicopters

Qualifications	Chief Engineer	Line Engineer
Total time on Aeroplanes/Helicopters (whichever applicable)	Five years	Two years
Engine/Airframe/Avionics Rating (where appropriate)	Yes	Yes
Accident and Violation Record	Two years accident free for human error causes, subject to review by the company	

(1) Includes the following type series: King Air 300, Twin Otter, Beech 1900, CASA 212, Metro III/23, Dornier 228 and Let 410.

(2) All instrument approach aid recency required to support the activity must be maintained within regulatory requirements. Instrument Ratings are NOT required for operations designated as VFR only.

(3) Competency-Based Training (CBT) reviewed and endorsed by a Competent Aviation Specialist may be used.

(4) If not met, a non-revenue check-flight by a qualified company check pilot is required.

(5) Some regulatory authorities may require the PIC to hold an ATPL for multi-crew operations.

Appendix 2: Basic Aircraft Equipment Fit

Helicopters and Aeroplanes

Equipment	Multi-engine	Single-engine	
Two VHF Transceivers	Required		
One HF Transceiver, if VHF coverage is not available for the entire area			
Mode C or S Transponder			
TSO 126 ELT			
GPS (IFR TSO required for night or IFR operations)			
Upper Torso Restraints (Helicopter and SE Aeroplane only)			
First-Aid Kit			
One Fire Extinguisher			
Survival Equipment, tailored to environment			
Automatic Electronic Engine Trend Monitoring – required for single-engine aircraft on long-term contract			
Fixed or portable electronic CO detection capability with a functioning audio alert for all piston engine fixed wing aircraft			
Internal PA system or effective ability to communicate with passengers	Required for passenger carrying operations		
Passenger Briefing Cards			
Autopilot or AFCS ⁽¹⁾	Required IFR or Night	Optional	
Two ADF, if NDB approach is only approved instrument approach available			
Two VOR/ILS			
VSI			
Radio Altimeter with audio and visual alert			
Color Weather Radar			
TCAS I – Rotary Wing	Required for dedicated long-term contracts		
TCAS II – Fixed Wing			
TAWS			
Satellite Flight Following (hostile environment)			
CVR/FDR, or as required by local CAA (>9 passenger seats)			
HUMS, UMS or VMS			
FDM			
Automatic Dependent Surveillance - Broadcast (ADS-B)			
Performance based navigation system where ground based navigation systems do not provide approach capability			
High Visibility Pulse Lights – in areas of traffic			
External Mirrors for situational awareness (helicopters only)	Optional		

(1) The following twin engine aircraft are exempt from this requirement: DHC-6 Twin Otter, Beech 99, Beech 1900, Beech King Air 90/100/200, Embraer Bandeirante, Fairchild Swearingen Metro III/IV, Let 410 and Jetstream J31/32.

Appendix 4: External Load Operations

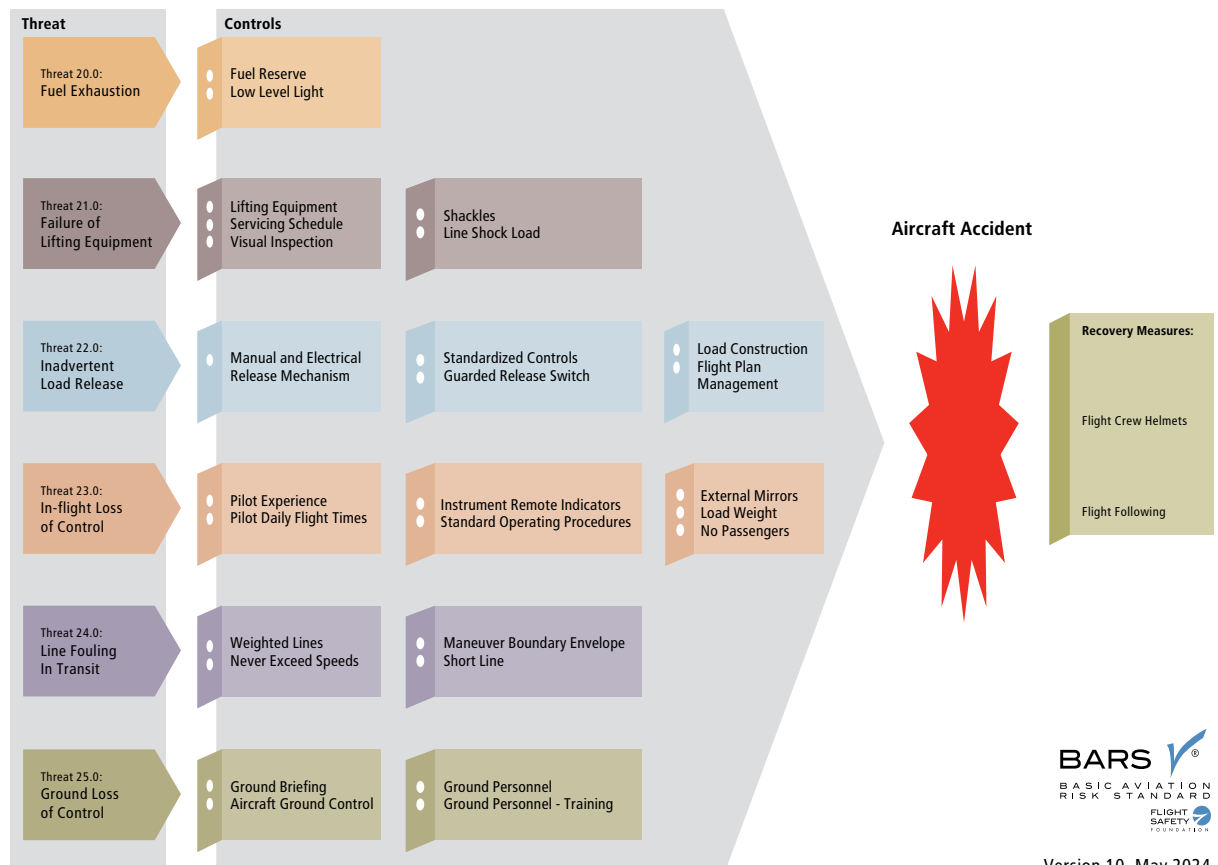
Helicopters provide the operational flexibility to move cargo and/or to perform low-level geophysical operations, using an external underslung load.

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.



20.0: Fuel Exhaustion

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.

20.1: Fuel Reserve

Ensuring sufficient fuel is carried, including required reserves.

Maintain a minimum fuel reserve of 20 minutes at all times.

Unless more reserve fuel is required to be carried following the completion of a risk assessment or by the responsible 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.

FLT 5.03.08

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).

20.2: Low Level Light

FLT 5.05.02

Ensuring flight crew situational awareness with regard to available fuel reserves.

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.



21.0: Failure of Lifting Equipment

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.

21.1: Lifting Equipment

Ensuring certification of lifting equipment and compliance with the equipment manufacturer's servicing requirements.

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.

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.

MNT 4.02.05



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.

21.2: Servicing Schedule

Ensuring early detection of impending failure of load lifting equipment.

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.

21.3: Visual Inspections

Ensuring servicing routines are supplemented with visual inspections prior to each use.

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, Loadmaster 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.

21.4: Shackles

Ensuring that shackles are compliant and compatible with other load lifting equipment.

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.

21.5: Line Shock Load

Ensuring all lines are checked for serviceability following a shock load event.

The aircraft operator must ensure that pilots are familiar with shock load, conditions that can lead to it and have a process in place for detailed line inspection following an actual or suspected shock load event. Where available, tell-tale links that provide visual confirmation a line has not been subjected to deformation resulting from shock load should be used.

Cables used for external load lifting will have a 'working load limit' which is the maximum load that should ever be applied under any conditions. However, the working load limit is based on the load being uniformly applied in a straight-line pull. Shock loads are those loads that exceed the straight-line loading, caused by rapid movement changes such as swinging loads, impacting with objects/ structures or jerking.

Shock loading of cables may not immediately result in the cable breaking, but it will certainly have a negative impact on the life of the cable and may result in a failure at some future time.

Aircraft operators must ensure that pilots are familiar with the concept of shock-loading and that any cable that is suspected of encountering a shock load event is thoroughly inspected prior to further use.

Tell-tale links that provide a visual confirmation of when a cable has undergone a shock loading event may also be available for Operators to incorporate into their external load equipment.



The aircraft operator should have a documented policy explaining the requirements around shock loading of cables. This should be supported by procedures to be followed in the event of pilots or ground crew experiencing a shock loading event, including how this is reported, the inspection process and any follow-up actions. Evidence should include SOPs and training records.

22.0: Inadvertent Load Release

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.

22.1: Manual and Electrical Release Mechanism

Ensuring that aircraft have appropriate mechanisms for release of loads in normal and emergency situations.

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.

22.2: Standardized Controls

Removing the potential of inadvertent load release.

MNT 4.02.07

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.

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.



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.

22.3: Guarded Release Switch

Removing the potential of inadvertent load release.

When available for the aircraft type, all electrical release switches must be guarded or collared to prevent inadvertent activation.

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.



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).

22.4: Load Construction

Ensuring that all loads are rigged by appropriately trained and qualified personnel, and all external lifts are flown to the agreed load plan agreed to by the pilot.

The aircraft operator must ensure that all loads are appropriately rigged by qualified personnel. The load plan for all external lifts must be documented and reviewed with pilot during the start-up operational risk assessment. Any deviation from the plan must first be agreed to by the pilot.

Helicopters are capable of lifting all types, shapes and sizes of external loads. However, it is critical that loads are carefully constructed by well trained and experienced personnel, in order that the load is safe and secure and does not cause adverse issues during flight.

The pilot must review load types and planning during the pre-operation risk assessment phase. Any deviations from the original plan must be advised to the pilot.

evidence



The aircraft operator must ensure that all personnel involved in the rigging of helicopter external loads have been appropriately trained. Policy and procedures for external load training requirements should be documented. Records should demonstrate that all personnel involved in external load lifting activities have completed appropriate rigging training. Operational Risk Assessments should confirm pilot involvement during the pre-start phase of the load lifting operations.

22.5: Flight Plan Management

Ensuring personnel below the aircraft are not impacted by release of the load.

FLT 5.03.10

The aircraft operator must have procedures that minimizes external load flights over populous areas, dwellings and personnel. Furthermore, ground crew working with external loads must be briefed not to enter the load footprint at any stage during approach or departure of the aircraft.

An integral and important part of managing risks associated with external load operations is ensuring that the flight path to be followed by the aircraft is managed in a way that minimizes and avoids where possible, over-flight of populous areas, dwellings and personnel.

Conduct of a pre-survey reconnaissance flight is to identify the locations of populous areas, dwellings and personnel and enable survey flight paths to be appropriately defined to avoid identified areas.

The operator's procedures should ensure that all ground personnel involved with the operation are appropriately briefed regarding the expected flight paths to and from the staging area, the precautions to be followed and need to remain clear of the load footprint.

evidence



The operator's procedures should document the requirements for adoption of flight-path management to avoid risks to persons and property on the ground and provide for a comprehensive briefing to be given to all relevant ground personnel prior to commencement of operations.

23.0: In-flight Loss of Control

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.

23.1: Pilot Experience

Ensuring flight crew are adequately trained and have sufficient experience to conduct helicopter external load operations.

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 1.4: 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).



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.

FLT 5.01.01

FLT 5.01.02

FLT 5.01.03

23.2: Pilot Daily Flight Times

Ensuring that the flight crew is not impacted by fatigue.

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.

23.3: Instrument Remote Indicators

Ensuring that flight crew can adequately monitor critical aircraft operational limits at all times.

FLT 5.05.01

For single-pilot operations using vertical referencing techniques and where the aircraft instruments are not in the pilot's scan, remote indication of fire warning light and torque gauge shall be fitted where possible 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.



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).

23.4: Standard Operating Procedures

Ensuring safe, efficient and standardized external load lifting operations.

The helicopter operator must have Standard Operating Procedures outlining requirements of personnel engaged in the external load activity. The procedures must be relevant to the local environment and terrain being operated in. All pilots engaged in external load operations must participate in a pre-start operational risk assessment with all ground crew to ensure the SOPs are agreed and understood.

The aircraft operator must have external load operations specific Standard Operating Procedures (SOPs) as part of their Operations Manual or similar document. These SOPs must prescribe both normal and emergency operating procedures associated with all aspects of external load operations, including ground personnel procedures.

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).



The aircraft operator must provide SOPs that clearly outline procedures for external load operations. These should include equipment checks, load preparation and ground operations, flying techniques, crew responsibilities, communication and emergency procedures.

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.

23.5: External Mirrors

Ensuring enhanced situational awareness of the external load at all times.

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.



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).



23.6: Load Weight

FLT 5.03.01

FLT 5.03.02

Ensuring accurate load weights are known and within aircraft limits.

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.

23.7: No Carriage of Passengers

FLT 5.03.07

Removing unnecessary exposure to risk for passengers.

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.

24.0: Line Fouling In Transit

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.

24.1: Weighted Lines

Ensuring helicopter systems cannot be fouled by unweighted lines.

The long-line must be weighted to prevent potential fouling with the tail rotor if the long-line is to be flown without a load attached. Implement pre-takeoff checks which are designed to ensure flight crew involved in repetitive load operations 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.

FLT 5.03.03

FLT 5.03.04

evidence



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.

24.2: Never Exceed Speeds

Ensuring that the external load remains stable and controllable at all times.

All applicable speed limitations 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 speed limitations, a separate risk assessment must be conducted and reviewed with a Competent Aviation Specialist prior to start.

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.



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.

24.3: Maneuver Boundary Envelope

Ensuring that the external load remains stable and controllable at all times.

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. Localized conditions, such as the effects of turbulence and wind, must be taken into consideration with the load design to ensure any aerodynamic potential of the load is minimized. Where necessary, apply lift-spoiling drag devices to the load to prevent dynamic instability.

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 preflight 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.

24.4: Short-Line (<50 feet)

Ensuring that the helicopter systems cannot be fouled by unweighted lines.

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.

25.0: Ground Loss of Control

A departure from normal operations on the ground results in loss of control of the load and aircraft and resulting 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.

25.1: Ground Briefing

Ensuring all personnel involved in the external load lifting operations are comprehensively briefed.

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.

The pilot should ensure a full and comprehensive preflight 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 Loadmaster, 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 Loadmaster, 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.

evidence



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.

25.2: Aircraft Ground Control

Ensuring safety of all personnel in the vicinity of helicopters conducting external load lifting operations.

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.

evidence



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.

25.3: Ground Personnel

Ensuring ground personnel have appropriate personal protection.

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.

25.4: Ground Personnel - Training

Ensuring ground personnel associated with external load activities have the required training.

All personnel associated with external load ground operations including load preparation and handling suspended loads must have received training relevant to the activity, such as the Flight Safety Foundation's Helicopter External Load Operations (HELO) course.

Ground operations involving helicopter external load lifting are extremely hazardous and it is crucial that all ground personnel involved in these operations have received appropriate training. Numerous courses are available including the Flight Safety Foundation's Helicopter External Load Operations (HELO) course.

Training courses should include

- Understanding helicopter performance limitations;
- Identifying threats and hazards associated with external load operations;
- Understanding the various types of load lifting equipment;
- Design and constructing external load operating areas;
- Understanding communications and signals used during load lifting;
- Practice in rigging loads; and
- Practice in hooking and unhooking external loads.



The aircraft operator must ensure that all ground personnel involved in helicopter external load operations have been appropriately trained. Policy and procedures for training requirements should be documented. Records should show that all ground personnel involved in external load lifting activities have completed appropriate training including type and dates of training.

29.0: Aircraft Accident

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 19.0 of the BAR Standard are applicable to external load operations, as are the additional defences listed below.

29.1: Flight Crew Helmets

Ensuring flight crew conducting external load operations have appropriate head protection.

Flight crew involved in external load activities must wear serviceable flying helmets that comply with industry standards.

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.

FLT 5.04.01

FLT 5.04.02

29.2: Flight Following

Ensuring that the position of helicopters conducting external load operations is known at all times.

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 19.5: 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 be 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.

FLT 1.12.04

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.

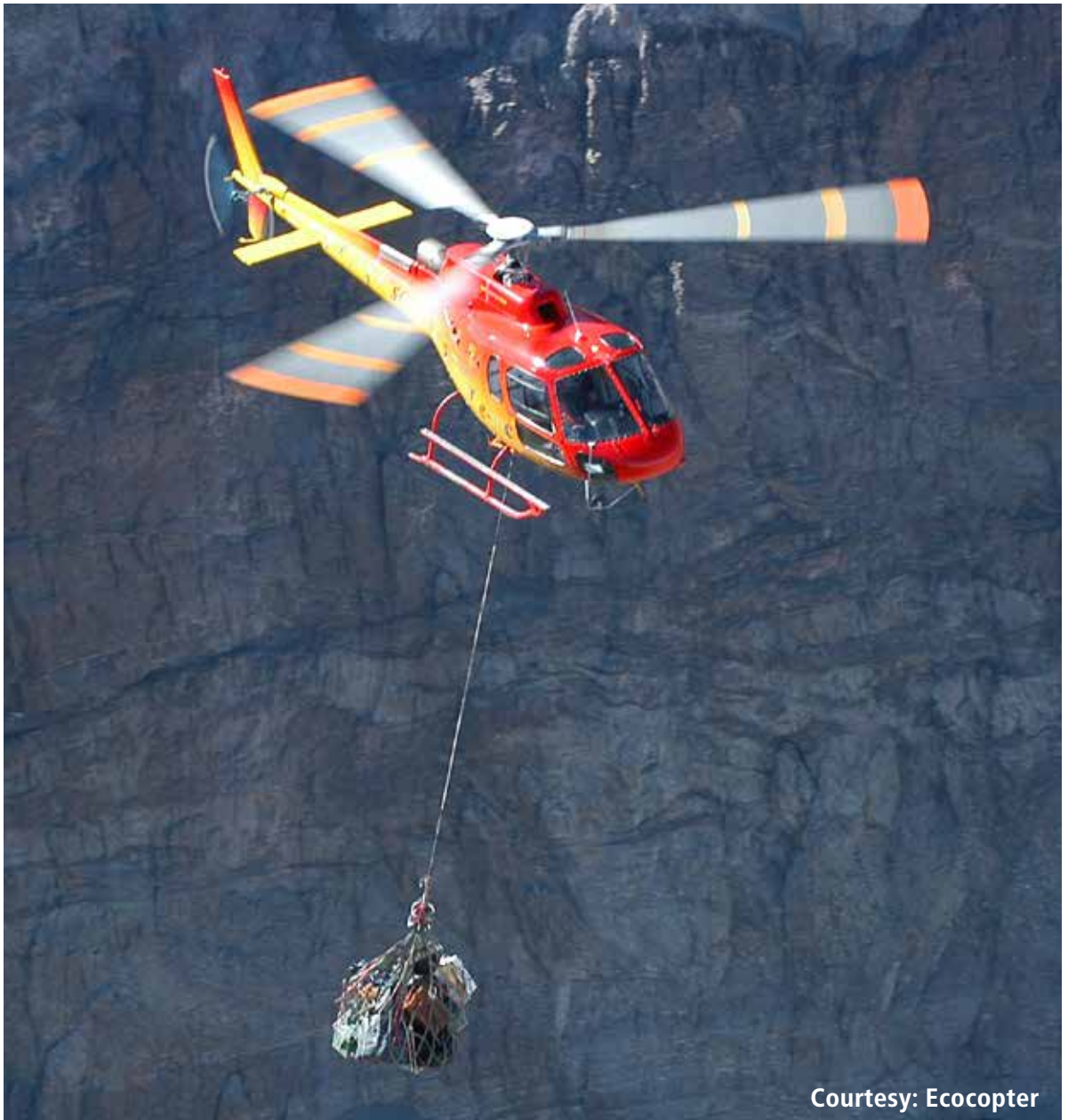
evidence



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.



Courtesy: Ecocopter

Appendix 5: Night Vision Goggles (NVG) Operations

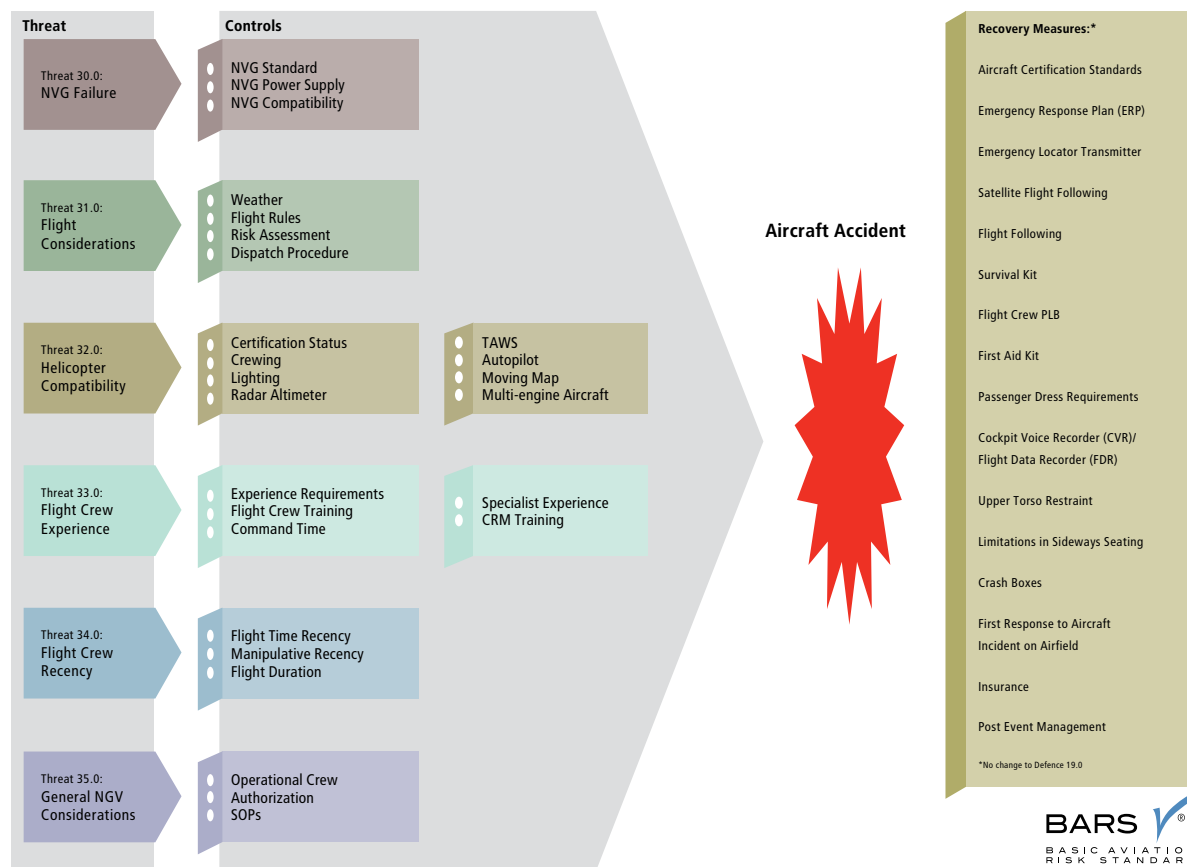
Night Vision Goggles (NVG) are binocular appliances that amplify ambient light and can be worn by pilots whilst flying at night. NVGs enhance the pilot's ability to maintain visual reference at night. Although NVGs can significantly improve the safety of flight, they are part of a complex system that includes aircraft modifications, equipment, training and procedures. All of these areas must be carefully considered to ensure NVG operations can be conducted safely.

Pilots flying under Visual Flight Rules (VFR) rely on visual information to avoid weather, obstacles and terrain and to maintain control of an aircraft's orientation. This visual information is significantly degraded during night operations. Specifically, visual acuity, the ability to estimate depth and the ability to identify objects is greatly diminished. Furthermore, color vision and peripheral vision are degraded or non-existent.

Night Vision Goggles (NVGs) are binocular devices that enhance unaided night vision for pilots. They are a passive device that intensifies ambient light and displays that image to the wearer. As they only amplify existing illumination, they cannot operate in a situation of absolute darkness.

Typically, NVGs are mounted on a pilot's helmet. This position enables pilots to look through the goggles outside the cockpit or under the goggles at the flight instruments. In most conditions, night vision goggles provide pilots with a significant increase in the

Figure 8: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and Recovery Measures for Night Vision Goggles (NVG) Operations.



quality of visual information compared with unaided night vision. They allow the pilot to see the horizon, objects, terrain and weather more easily. Furthermore, they assist the pilot to maintain spatial orientation, to avoid hazards such as inadvertent Instrument Meteorological Conditions (IMC) entry, and to navigate visually.

NVG technology was initially the exclusive domain of the more advanced military forces. Although the military use NVGs in both fixed-wing and rotary-wing operations, in civil operations, NVGs are used almost exclusively by helicopter operators.

This includes operations such as:

- Search and Rescue;
- Law Enforcement;
- Aerial Firefighting;
- Aerial Firefighting support;
- Emergency Medical Services;
- Marine Pilot Transfer; and
- NVG training, checking and testing.

Despite the many advantages associated with NVGs, their application has limitations. Compared with optimal day vision, they are monochromatic, have a limited field of view, and a lower visual acuity. In addition, the quality of the NVG image is variable depending on the operating environment. For example, the quality of the NVG image can vary depending on the amount of celestial illumination, the intensity of direct bright light, weather conditions, the height above the surface and speed of the helicopter.

In order to use NVGs safely, a Night Vision Imaging System (NVIS) is required of which NVGs form just one part. This is a comprehensive system, which includes helicopter cockpit lighting that does not degrade the NVG image, additional external lighting, other required aircraft components and equipment, in addition to initial and recurrent crew training, operating procedures and airworthiness requirements. Any operator considering the use of NVGs also needs to consider the resources required to support all of these elements.

While NVIS have been developed with the aim of improving flight safety, their operation may also represent a flight safety hazard due to, for example; equipment failure and compatibility, improper flight preparation, issues with regard to flight crew training, the quality and depth of regulatory oversight and inadequate Standard Operating Procedures (SOPs).

Due to the complex and highly specialized nature of helicopter NVG operations, companies should seek appropriate specialist aviation advice before engaging aircraft operators to conduct NVG operations.

30.0: NVG Failure

NVG equipment failure leads to one or more of the crew losing night vision capability and disorientation

30.1: NVG Standard

Ensuring NVGs are certified to the correct standard.

FLT 8.01.06

NVGs must be certified to a minimum standard of TSO-C164 (equivalent of ANVIS 9 with Omnibus 4 Image Intensifier Tubes). Goggles introduced post release of TSO-C164 must meet the performance requirements of RTCA/DO-275.

There have been a number of 'generations' of NVGs and the technology is still evolving rapidly. Early versions of NVGs were far more limited in visual acuity and required a significant amount of ambient light to provide reasonable enhancement. Later generations incorporated substantial improvements in the image intensifier tubes, leading to the latest technology in Gen 3 and Gen 3+ devices that provide optimum performance.

TSO-C164 is a Technical Standard Order issued by the Federal Aviation Administration (FAA), effective date 30 Sep 2004, which details the minimum prescribed standard for the design, performance and manufacture of parts and materials used in NVGs.

RTCA/DO-275 addresses the design and maintenance of NVIS.



Documented procedures for the operation, serviceability, testing and maintenance of NVGs should be provided in appropriate manuals such as the Operations Manual and Maintenance Manual as required and applicable. The operator's documentation should reference TSO-C164 and/or RTCA/DO275 and the operations and maintenance of the NVIS should be aligned with the requirements of those references.

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

30.2: NVG Power Supply

Ensuring NVGs have a power supply with back-up facility that is independent of aircraft electrical systems.

FLT 8.01.07

NVGs must be battery powered (not supplied by aircraft electrical power) and equipped with an automatic power supply change over, or a minimum 30 minute battery warning to the user.

NVGs must be powered by a battery pack that is totally independent of aircraft power sources. In the same sense that a pilot can still see outside the aircraft in the event of a total electrical failure, NVGs must also be totally independent of all aircraft electrical systems. This is generally achieved through the use of a main and reserve battery pack.

A battery power module provides sufficient electrical power for operation of the binocular and includes both primary and secondary sources. Each source is capable

of independently operating the binocular for equal duration and may also include provisions to interface with an external power source. In this case, the power module supplies uninterrupted power to the binocular in the event of failure of the external power source. A 30 minute low-power indicator signals the user to select the spare power module source when primary power is insufficient to operate the binocular. The low-power indicator is visible to the user.

Operators should provide batteries and a battery usage system in accordance with manufacturer's requirements. Ideally, aircraft operators would have battery usage systems that ensure a fully charged set of NVG batteries are available in the primary and secondary battery compartments of each crew member's individual battery packs.



OEM data on NVG power supply options and management. Documented procedures for the serviceability, testing and maintenance of NVG battery packs should be provided in appropriate manuals such as the Maintenance Manual or SOPs as required and applicable.

NVG maintenance records must detail the completion of serviceability testing and maintenance procedures for NVGs and NVG battery packs, and show that devices are being maintained in accordance with the approved System of Maintenance.

30.3: NVG Compatibility

Ensuring all NVGs used by flight crew are compatible with spares available.

Each crew member must use the same model of NVG. Carry on-board a spare set of NVGs of the same model and make them readily accessible by the crew.

NVGs and their associated equipment such as battery packs require training and practice to ensure the pilot is fully conversant with their operation. In order to provide standardization of training and redundancy in the event of goggle failure, all NVGs (including spares sets) that are carried in an aircraft must be of the same make and model.



Documented procedures for the operation of NVGs should be provided in appropriate manuals such as the Operations Manual and these procedure should specify the need for all NVGs to be of the same make and model and that at least one spare set of NVGs with spare battery packs is carried on all NVG flights and is readily accessible by flight crew.

NVG maintenance records should demonstrate that devices are of the same make and model.

31.0: Flight Considerations

Preflight preparation must take into account the anticipated weather and visibility to support safe NVG operations

31.1: Weather

Ensuring weather conditions are suitable for NVG operations by meeting Visual Meteorological Conditions.

Forecasted weather conditions along the planned route must meet Visual Meteorological Conditions (VMC) or better. The weather forecast must provide:

- *Illumination prediction (moon, starlight); and*
- *Risk of reduced visibility in blowing snow, dust, haze.*

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.

The latest terminal and area forecasts should be obtained and analyzed with particular emphasis on temperature/dew point spread, cloud cover and visibility, sunset, civil and nautical twilight, moon phase, moonrise and moonset, and moon and/or lux illumination levels for all phases of flight. The operator should establish minimum illumination criteria and provide a means for determining illumination levels in the operating area. Clear starlight may provide sufficient light for some operations.

evidence



The aircraft operator must document a description of minimum weather and illumination criteria for NVG operations. The operator must also publish expectations associated with weather forecast review used in support of NVG preflight 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, alternate destinations. Documentation associated with the flight should be retained for a minimum period of 90 days and this information should include any relevant meteorological forecasts.

FLT 8.01.09

FLT 8.01.10

31.2: Flight Rules

FLT 8.01.09
FLT 8.01.13

Ensuring helicopters are dual pilot capable and certified for Instrument Flight Rules flight as a safety redundancy measure.

Helicopters must be fully Instrument Flight Rules (IFR) compatible (refer to Controls 5.1 to 5.10 and Appendix 2) and certified for dual IFR operations in accordance with local regulatory requirements.

Due to limitations in visual acuity when using NVGs, crews should always remain cognizant to changes in the weather. It is possible to 'see through' some areas of light moisture when using NVGs, thus increasing the risk of inadvertently entering instrument meteorological conditions (IMC).

Despite careful preparation, the potential for inadvertent IMC penetration may exist. Therefore, it is important that crews are able to recognize subtle changes to the NVG image that occur prior to entry into instrument meteorological conditions (IMC).

These include:

- Onset of scintillation;
- Loss of scene detail; and
- Changes in the appearance of halo.

The decision to delay taking avoiding action in deteriorating conditions will reduce safety margins, particularly if at lower altitudes.

Ensuring that aircraft and crews are fully IFR capable enables a safe reversion to IFR and an ability to commence climb to safe altitude should the aircraft encounter poor weather and/or inadvertently enter IMC.



The aircraft operator must have a documented procedure requiring that NVG flights are conducted in IFR compatible aircraft and are crewed by two qualified and current IFR pilots. Evidence must also be provided that the aircraft is suitably equipped for IFR flight. 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. Associated flight records should confirm that NVG flights 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.

31.3: Risk Assessment

FLT 8.01.12

Ensuring all risks associated with NVG operations are analyzed, minimized and accepted.

Perform and document a risk assessment and brief the crew on it prior to each NVG 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.

Aircraft operators must conduct a risk assessment, including mitigation controls, before commencing NVG operations.

In addition to the aircraft operator's overall risk assessments relating to NVIS operations using NVG, the crew should undertake a risk assessment prior to each NVG operation.

At a minimum, the risk assessment should include:

- Illumination level;
- Weather;
- Crew recency and experience;
- Operator experience with NVG operations;
- Crew vision;
- Crew general wellbeing (fitness to fly);
- Windshield/window condition;
- NVG tube performance;
- NVG battery condition (battery charge duration exceeds expected flight time);
- Types of operations allowed and to be undertaken;
- External lighting environment; and
- Assessment of task duration and consideration given to reasonable alertness and fatigue management.

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

31.4: Dispatch Procedure

Ensuring NVG operations are appropriately planned, risk assessed and authorized.

Develop and implement a flight dispatch procedure that covers mission development, flight planning, risk assessment, mitigation and authorization processes.

NVG operations are a complex and specialized type of flying operation and demand comprehensive planning and flight dispatch procedures.

Flight dispatch procedures must be documented and include:

- NVG mission planning;
- Crew allocation;
- Route selection;
- Flight notification procedures;
- Flight following procedures;
- Weather and NOTAMS;
- Risk assessment including application of hazard and threat identification and application of mitigation controls; and
- Flight authorization.

evidence



The aircraft operator's Operations Manual and/or SOPs should detail roles and responsibilities of those involved in flight dispatch for NVG operations, including detailed procedures. Associated flight records should be able to confirm effective dispatch procedures for NVG flights and implementation.

FLT 8.01.11

32.0: Helicopter Compatibility

Insufficient or incompatible equipment or aircraft features lead to a misinformation or misjudgement by the crew

32.1: Helicopter Certification Status

Ensuring helicopters that conduct NVG operations are appropriately certified for NVIS.

Helicopters must be produced or modified with an NVIS certification under an approved Supplementary Type Certificate (STC) or Federal Aviation Administration (FAA) AC 27-1B MG 16 (or equivalent) and/or FAA AC 29.2C MG 16 (or equivalent).

NVGs are just one part of a Night Vision Imaging System (NVIS). This is a comprehensive system that includes helicopter cockpit lighting that does not degrade the NVG image, additional external lighting, pilot lip lights and finger lights and other required aircraft components and equipment. Some new generation helicopters are manufactured with NVG compatible cockpits from the outset.

In the case of older helicopter types where NVIS modifications have been made, it is critical that the aircraft operator undertakes the modifications in accordance with approved engineering data; either an STC or through compliance with a specific Engineering Order (EO), and these are certified by the responsible regulatory authority.



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.

32.2: Helicopter Crewing

Ensuring helicopters that conduct NVG operations are appropriately crewed.

Helicopters must be crewed by two-pilots with dual controls and instruments for full IFR operations.

The intent of the requirement for the second pilot is to ensure that NVG scan sectors are maximized during flight to unlit or unprepared landing sites, and to ensure a second set of trained NVG eyes in the unlikely circumstance of goggle failure close to terrain, or loss of NVG visual reference due to brown out, white out, etc. The second pilot should, in accordance with procedures detailed in the Operations Manual, assist the flying pilot as required for obstacle clearance, rates of descent, attitudes, power settings, etc.

In addition, the second pilot fulfills the requirement should the aircraft need to revert to IFR procedures.



The aircraft operator's Operations Manual and/or SOPs should detail roles and responsibilities of those involved in multi-crew NVG 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 NVG flights are crewed by two appropriately qualified and current pilots in accordance with the aircraft operator's policy. Flight crew files and rostering records would confirm implementation.

32.3: Helicopter Lighting

Ensuring helicopters that conduct NVG operations are equipped with external lighting to permit safe operations.

Helicopters must be equipped with a fully steerable searchlight (preferably infrared) capable of being operated from either pilot station.

Viewing a scene indirectly via illumination by an artificial illumination source such as a steerable searchlight provides greater contrast and detail into the night vision image, thereby enhancing safety. It enables the flight crew to perform wire and obstacle detection and avoidance procedures using white light or infrared and allows evaluation of clear approach and departure paths.

MNT 6.01.02



The aircraft operator should document in their Operations Manual/SOPs the use of the searchlight during NVG operations. Aircraft inspection and maintenance records will verify fitment and dual control of the searchlight.

32.4: Radar Altimeter

Ensuring the provision of reliable RADALT data and warning to provide clear and reliable awareness of height above terrain/water.

Helicopters must be equipped with either a dual output radar altimeter, or two independent radar altimeters equipped with visual and aural height warnings with variable height alert that can be set by the flight crew.

All helicopters conducting NVG operations must be equipped with at least one radar altimeter with dual outputs or with two independent radar altimeters with audio and visual alert, both of which must be serviceable for any NVG 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 defense to prevent a Controlled Flight Into Terrain/Water (CFIT/W) accident.

MNT 6.01.03



The aircraft operator must document in the Operations Manual or MEL, a requirement for the radar altimeter systems to be serviceable at the time of dispatch for any NVG operations. 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.

32.5: Terrain Awareness Warning System (TAWS)

MNT 6.01.04

Ensuring the accurate detection of terrain and adjacent obstacles so as to allow timely corrective action if necessary.

Helicopters must be equipped with a Terrain Awareness Warning System (TAWS) that meets the requirements of TSO-C194.

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.

TSO-C194 is a Technical Standard Order issued by the Federal Aviation Administration (FAA), effective date 17 Dec 2008, which details the minimum prescribed standard for the design, performance and manufacture of parts and materials used in helicopter TAWS.



The aircraft operator must publish SOPs, consistent with the information provided in the aircraft and/or TAWS OEM data clearly specifying procedures including:

- Training and checking requirements;
- Use of the simulator (where available);
- Preflight serviceability checks;
- Action to be taken by flight crew in the event of a TAWS alert;
- Use of the override function; and
- Reporting of alerts.

Where TAWS is fitted to the aircraft operator's aircraft, the maintenance regime should detail TAWS database update intervals. Provisions relevant to TAWS should be included in the operator's MEL and pilot training program.

32.6: Autopilot

MNT 6.01.05

Ensuring pilot workload is minimized.

Helicopters must be equipped with a three-axis autopilot to relieve crew workload.

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.



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.

32.7: Moving Map

Provision of enhanced situational information to the flight crew.

MNT 6.01.06

For long-term contracts exceeding three years, and where practicable for the aircraft type, a moving map capability must be fitted to enhance crew situational awareness.

A moving map capability is a representation of a geographic area in which an aircraft's position is depicted. As the aircraft's position changes, so does the map area, adjusting itself to keep up with the aircraft's progress along its flight path. This provides pilots with a high level of situational awareness, which can significantly enhance the safety of NVG operations.

evidence



The aircraft operator should document in their Operations Manual/SOPs the use of a moving map display during NVG operations. Aircraft inspection and maintenance records will verify fitment of such displays and must include reference to the map update cycle to ensure the most up to date database is utilized.

32.8: Multi-engine Aircraft

Ensuring the safety of occupants in the event of engine failure.

FLT 8.01.14

Use a multi-engine aircraft when conducting flights on NVGs.

Although NVG operations greatly enhance night flying operations, there remain significant visual limitations, including reduced depth perception. In the event of an engine failure in a single-engine aircraft, the reduced visual input may reduce the probability that a successful emergency landing can be conducted. Employment of a multi-engine aircraft also permits transition to IFR flight in accordance with BARS Control 10.2.

BARS Member Organizations contracting for NVG operations should require multi-engine aircraft.

evidence



If the aircraft operator's fleet includes single and multi-engine aircraft, records should be reviewed to ensure that only multi-engine aircraft are utilized on BARS NVG operations.

33.0: Flight Crew Experience

A lack of training or experience leads to loss of control and accident

33.1: Flight Crew Experience Requirements

Ensuring flight crew are competent to conduct NVG operations by having appropriate experience.

In addition to Appendix 1 requirements, all flight crew must have a minimum of 50 hours of night (VFR or IFR), unaided flight time.

NVG operations are a highly specialized component of night flying, but NVGs are not generally utilized for the entire night flight. Flight crew will transition to and from goggles as required. Therefore, it is essential that pilots have core night flying experience as well as NVG experience. Furthermore, in the event of a goggle failure and reversion to non-NVG operations, the pilot must be competent in all aspects of unaided night flying.



The aircraft operator must document minimum night flying 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 controls ensuring that those pilots 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.

33.2: Flight Crew Training

Ensuring flight crew are competent to conduct NVG operations through appropriate training.

Flight crew must have successfully completed an approved NVG course that includes a minimum of five training sorties of at least one hour flight time duration each.

Helicopter NVG flying operations are highly specialized and flight crew training and checking must be conducted in accordance with a detailed syllabus approved by the responsible authority and included in the Operations Manual. The flight crew training syllabus should include the following items: NVIS working principles, eye physiology, vision at night, limitations and techniques to overcome these limitations; preparation and testing of NVIS equipment; preparation of the helicopter for NVIS operations; normal and emergency procedures including all NVIS failure modes; maintenance of unaided night flying; crew coordination concept specific to NVIS operations; practice of the transition to and from NVG procedures; awareness of specific dangers relating to the operating environment; and risk analysis, mitigation and management.

The flight crew checking syllabus must include night proficiency checks, including emergency procedures to be used on NVIS operations, and line checks with special emphasis on the following: local area meteorology; NVIS flight planning; NVIS in-flight procedures; transition to and from NVG; normal NVIS procedures; and crew coordination specific to NVIS operations.

evidence



Details of the aircraft operator's training and checking program for NVG training must be published in the Operations Manual (or similar) and follow established criteria. The program must be approved by the responsible regulatory authority and must cover requirements and procedures for initial training and approval along with the processes for conducting periodic recurrent training and checking. Associated pilot training records must confirm that applicable requirements of the training program have been applied in the training of pilots engaged in NVG operations and the ongoing annual evaluation of pilot competency in this role.

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

33.3: Pilot Command Time

Ensuring the Pilot-in-Command is competent to command NVG operations through appropriate experience.

FLT 8.02.03

The aircraft captain must have ten hours Pilot-in-Command NVG flight time logged.

NVG operations are a highly specialized type of flying. There can be a substantial experience/training gap that exists between a newly endorsed NVG pilot and a line qualified NVG pilot with an operator. The accrual of appropriate experience through exposure to differing NVG operations and environments should improve safety outcomes.

evidence



The aircraft operator must document minimum NVG flying experience requirements for the Pilot-in-Command.

Where the BAR Standard is not used for all operations, there should be controls ensuring that flight 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.

33.4: Specialist Experience

FLT 8.02.04

Ensuring flight crew conducting specialist NVG operations have appropriate training to allow safe operations.

Where specialist NVG operations are considered (for example, confined area, hook, hoist, Marine Pilot Transfer), qualifications as required by each role must be certified by the NVG training provider.

When properly utilized, NVGs can increase safety, enhance situational awareness, and reduce the workload and stress that is typically associated with night operations. Their application is fully exploited when being used in specialist operations such as Marine Pilot Transfer, Emergency Medical Services, Search and Rescue, Aerial Firefighting, etc.

All specialist role NVG operations require appropriate training and qualifications via an approved and certified NVG training provider.



Details of the aircraft operator's training and checking program for all operations utilizing NVGs must be published in the Operations Manual (or similar). The program must be approved by the responsible regulatory authority and must cover requirements and procedures for initial training and approval along with the processes for conducting periodic recurrent training and checking in specialist operations. Associated pilot training records must confirm that applicable requirements of the training program have been applied in the training of pilots engaged in NVG operations and the ongoing annual evaluation of pilot competency.

33.5: Crew Resource Management (CRM) Training

FLT 2.02.02

FLT 8.02.05

Ensuring the CRM training for flight crew involved in NVG operations includes NVG specific scenarios.

In addition to the CRM training requirements contained in Appendix 1, the aircraft operator must provide role-based scenarios for NVG crew in a CRM recency context.

Due to the inherent limitations of night vision imaging system (NVIS) operations, emphasis should be placed on good communication, teamwork and cockpit management. NVG flight requires effective CRM between all crew members, not just flight crew. CRM procedures and training should include all crew on-board. CRM procedures should be addressed in detail in the aircraft operator's Operations Manual and covered as part of the preflight briefing. Aircraft operators should produce specific NVG CRM procedures (including standard crew duties and phrases) involving all NVG aircrew in all phases of flight.



Syllabi of training for CRM, including specific procedures associated with NVG operations, should be published in the aircraft operator's Operations Manual and should include all assigned flight crew and additional 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).

34.0: Flight Crew Recency

A lack of recent NVG experience leads to a manipulative error and accident

34.1: Flight Time Recency

Ensuring minimum flight crew recency to enable safe NVG operations.

FLT 8.02.06

In addition to Appendix 1 requirements, flight crew must complete a minimum of 50 hours flight time in the preceding 90 days; 10 hours of which must be on the aircraft type.

Like all flying competencies, NVG operations are a perishable skill if not maintained via a rigid program of currency requirements. NVG operations introduce an additional level of complexity to normal flying operations; therefore, it is critical that flight crew are completely comfortable with all normal and emergency operations of the particular aircraft type.

Flight crew manipulative skills need to be practiced frequently to maintain minimum competencies. This is particularly true for night and night/NVG 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 specific NVG recency training flights 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 method for tracking flying recency requirements. Manual, paper-based systems are acceptable; however, computer programs that more accurately track the varying limits are the preferred option. Where the BAR Standard is not used for all operations, controls should be in place to ensure that crew who do not meet BARS recency requirements are excluded from BARS operations until such time as these requirements are met. Associated records should confirm that pilots are maintaining the required recency requirements 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.

34.2: Manipulative Recency

FLT 8.02.07

Ensuring minimum 'hands on' time for flight crew to enable safe NVG operations.

Each pilot must complete the following in the preceding 90 days using NVGs:

- *Three night takeoffs;**
- *Three night landings;**
- *Three specialist hovering tasks; and*
- *Three transition tasks (NVG to non-NVG back to NVG operations).*

** Must include a climb, level flight segment and descent of at least the equivalent of one circuit for each rotation.*

Flight crew manipulative skills need to be practiced frequently to maintain acceptable competencies. This is particularly true for NVG operations where a combination of manipulative skills and situational awareness require optimum performance and dexterity from the flight crew.

As with most helicopter flying, high workload phases of flight, such as lift-off, hover, maneuvering in the hover, takeoff, approach and landing, require regular 'hands-on' practice to maintain flying skills. Simply donning NVGs as the pilot-not-flying, or maintaining flight via autopilot/AFCs, does not provide sufficient currency. In addition, the process of transitioning from normal night flying to NVG operations and vice-versa requires practice.

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, NVG takeoffs and landings, NVG hovering operations and NVG transition tasks.



The aircraft operator must document the system by which NVG flying 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 NVG operations, controls should be in place to ensure that crew who fail to meet the Standard NVG recency requirements are excluded from BMO operations until these requirements are met. Associated records must confirm that pilots are maintaining the required NVG recency and that the rostering system has attended to upcoming requirements prior to expiry. Flight crew files and rostering records should confirm implementation.

34.3: Flight Duration

Ensuring flight crew fatigue is appropriately managed due to the higher workload of NVG operations.

FLT 8.02.08

Each pilot must not be scheduled to fly more than five hours on NVGs during any single flight duty period.

Physiological limitations that are prevalent during the hours of darkness along with the limitations associated with NVGs may have a significant impact on NVG operations. Some of these limitations are the effects of fatigue (both acute and chronic), stress, eyestrain, working outside the pilot's normal circadian rhythm envelope, increased helmet weight, aggressive scanning techniques associated with NVGs, and various human factors engineering concerns that may have a direct influence on how the pilot works in the aircraft while wearing NVGs. These limitations may be mitigated through proper training and recognition, experience, adaptation, rest, risk management, and proper crew rest/duty cycles.

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 NVG 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.

Courtesy: Skyhorse Aviation



35.0: General NVG Considerations

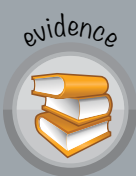
35.1: Operational Crew

Removing unnecessary exposure to risk for passengers.

Do not carry passengers on training or operational flights, other than those specifically authorized for the task by both the company and aircraft operator.

To eliminate unnecessary exposure to risk, only personnel who are essential to the safe conduct of an operation can be carried on-board the helicopter during NVG operations. The exception is if the specific role of the helicopter is the carriage of passengers, e.g. marine pilot transfer.

The aircraft operator must document in the Operations Manual or SOPs, clear guidance and restrictions on the carriage of passengers during NVG operations.



The aircraft operator should include a requirement in the Operations Manual and/or SOPs that only personnel who have a role that is directly related to the safe conduct of an NVG operation are carried on helicopters during each flight. Auditor observations of operations where possible and review of flight planning manifests can confirm compliance with the aircraft operator's requirements that no passengers must be carried during NVG operations.

35.2: Authorization

Ensuring NVG operations have local regulatory authority approval.

Aircraft operators must be approved by the local regulatory authority for the conduct of NVG operations. All local regulatory requirements must be met, and will take precedence to any requirement contained in this Standard.

Civilian NVG operations are a relatively new category of flying operations. State regulatory authorities have implemented strict requirements that cover all aspects of NVG flying including training, qualifications, equipment specifications, risk management and procedures.



The aircraft operator should have NVG operations endorsed on their Air Operator Certificate (AOC) operational specifications or similar. Flight crew require logbook endorsements and their training records and files should reflect qualifications for specialized NVG operations.

35.3: Standard Operating Procedures

Ensuring safe, efficient and standardized NVG operations.

FLT 8.01.02

FLT 8.01.03

FLT 8.01.04

Aircraft operators must have SOPs that define:

- *NVG crew roles and responsibilities;*
- *Goggle/de-goggle procedures and limitations; and*
- *Emergency de-goggle procedures.*

The aircraft operator must have NVG specific Standard Operating Procedures (SOPs) as part of their Operations Manual or similar document. These SOPs must prescribe both normal and emergency operating procedures associated with NVGs. In addition to technical instructions on NVG operation, the SOPs should include all aspects of NVG flying including crew roles and responsibilities, transition procedures for goggle and de-goggle, inadvertent IMC procedures and other applicable emergency procedures.

evidence



The aircraft operator must provide SOPs, consistent with the information provided in the manufacturer's handbooks, that specify procedures for use and management of NVGs. Training syllabi relating to NVG capabilities, limitations, and operating procedures should be published. Training records must confirm that training requirements have been applied.



Courtesy: Nautilus Aviation

Appendix 6: Airborne Geophysical Survey Operations

Airborne geophysical survey flight represents one of the highest risk flight regimes supporting the resource sector. All proposed geophysical flight activities must be subject to a detailed risk analysis that meets all controls within this section and that of the International Airborne Geophysical Safety Association (IAGSA).

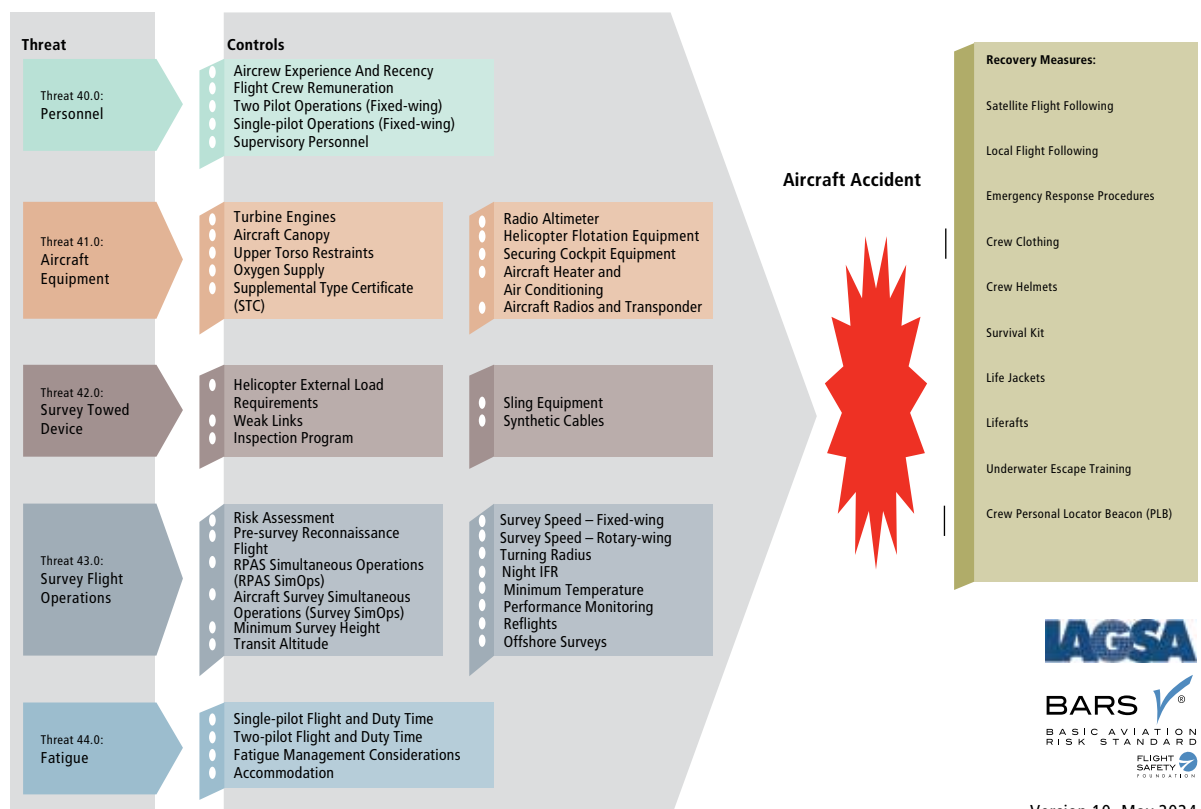
Airborne geophysical flying demands a high degree of precision flying quite often in fatiguing conditions with the aircraft operating at its performance limits. A clear focus on all critical controls coupled with a high degree of operating discipline is essential for safe conduct of flying operations. This is applicable for both fixed-wing and helicopter operations.

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 a combination of: (1) BARS audits of the aircraft operator; (2) a detailed risk assessment prior to the activity; (3) on-site start-up operational review when considered necessary from a risk-based perspective.

Critical controls for airborne geophysical flying will always include (1) aircraft and survey equipment, (2) personnel (3) fuel, (4) adherence to minimum weather requirements and (5) fatigue management.

Figure 9: 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 IAGSA.



40.0: Personnel

Inadequate experience or high workload causes poor decision making and results in an accident

40.1: Aircrew Experience and Recency

Ensuring flight crew are competent to conduct survey operations duties by having appropriate training, qualifications and recent experience.

The following requirements are in addition to those listed in Appendix 1.

FLT 2.01.04

FLT 7.02.01

FLT 7.02.02

Experience and Recency Requirement	Supervisory Personnel	Captain	Co-Pilot	Other crew	Footnote
All BARS Appendix 1 requirements		Yes	Yes		6
Total time – geophysical		300 hours	10 hours		6
Command/ICUS time – geophysical		300 hours	0 hours		1, 6
Command/ICUS on contract aircraft type		100 hours	0 hours		2, 6
Command/ICUS preceding 90 days		50 hours, ten on contract aircraft type	0 hours		2
Geophysical training program		Yes	Yes	Yes	3
Simulator training		Yes	Yes		4
Underwater Escape Training		Yes	Yes	Yes	5
Survey Crew Resource Management		Yes	Yes	Yes	
Supervisory Experience	Yes				7

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. Successful completion of a geophysical line check by a qualified company check pilot of at least two hours on the contract aircraft type being used for survey (excluding use of ferry time) may be used for the preceding 90 day recency requirements. Furthermore, the type-specific line check may be used in lieu of 50% of the 100 hours Command/ICUS time on aircraft type required. 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 the training in the actual aircraft, pilots should, where practical, undergo simulator training in a type-specific simulator representing the aircraft being flown on survey. Training should include type specific, instrument and emergency procedures training, as well as successful completion of low-level segments representing typical survey profiles in which emergencies are introduced under varying environmental conditions. The training should be conducted at a minimum of once every two years. In the event of a type-specific simulator not being readily available a generic simulator or procedural trainer should be utilized while recognizing their additional limitations.
5. Underwater Escape Training must be conducted for all crew involved in over-water ferry flights and offshore geophysical operations and maintained within a three year recurrency period.
6. A geophysical orientated Competency-Based-Training (CBT) reviewed and endorsed by a Competent Aviation Specialist may be used, as further described in Common Control 1.4.
7. Approved Supervisory Experience includes managing Geophysical surveys, performing geophysical Check and Training roles, Head of Flight Operation roles and any relevant flight operations management duties suitable for project oversight.

40.2: Flight Crew Remuneration

FLT 7.01.02

Ensuring that the safety of survey operations is not compromised by unnecessary pressure on flight crew.

To remove unnecessary pressure to fly and potentially compromise minimum standards, flight crews must not be paid or incentivized based on hours or distance flown.

Coupling flight crew remuneration on hours or distance flown introduces a risk of pushing fatigue limits, weather limits or aircraft limits past the point of safe and reasonable operation. Remuneration should be based on an agreed contract basis, unrelated to production rates.



The aircraft operator must provide evidence that contracts will only be agreed if flight crew remuneration is not paid or incentivized based on hours or distance flown.

40.3: Two Pilot Operations (Fixed-wing)

FLT 7.05.01

Ensuring fixed-wing surveys are conducted as two pilot operations when selection of aircraft type allows it.

Aircraft with two-seat cockpits fitted with dual controls and flown with two pilots should be the preferred type specified for contracts requiring fixed-wing aircraft support.

In addition to providing a second pilot to a two-crew complement, the non-flying pilot may also be tasked with geophysical operator duties that must be documented alongside crew responsibilities. As a non-flying pilot, tasks will include, but not be limited to:

- Radio calls;
- Fuel management; and
- Flight planning discussion and consideration.

The provision of a co-pilot as a crew member further facilitates geophysical flying career progression using a structured Competency-Based Training (CBT) system described further in the IAGSA/BARS framework.



The aircraft operator should document appropriate policy on survey aircraft selection and crewing requirements. It should also describe non-flying pilot tasks.

40.4: Single-Pilot Operations (Fixed-wing)

Ensuring selection of single-pilot operations is made only after accepting the workload environment of the survey being proposed can be adequately managed.

Single-pilot only fixed-wing operations must be approved by all stakeholders after conducting a risk assessment that supports single-pilot workload and where necessary

identifies additional controls specifically aimed at mitigating the reduction in two-crew decision-making.

These additional controls can include, but not be limited to:

- Daily preflight call with supervisory personnel assessing all safety factors associated with the planned activity; and
- Daily on-site preflight briefing with all flight crew assessing weather, terrain, known obstacles and the planned activity.

For single-pilot operations without an equipment operator, the pilot's duties shall be those normally associated with flying the aircraft and those duties shall not be increased because of the absence of an operator.

evidence



The aircraft operator should document appropriate policy on single-pilot duties.

40.5: Supervisory Personnel

Ensuring all operations have effective supervision by senior aircraft operator flight operations management.

FLT 7.01.03

The aircraft operator must nominate the supervisory personnel accountable for providing oversight of the survey flight operations. The personnel do not necessarily have to be on-site, but the manner and frequency of contact with field-based personnel must be documented. Nominated supervisory personnel must meet with the intent outlined in the table presented in Control 40.1.

Industry accident and incident data has demonstrated the value in multiple input when it comes to aeronautical decision making. As outlined by Control 40.3, the preferred option is always to have two crew when fixed-wing operations are concerned. Of equal importance is how the aircraft operator provides senior supervisory oversight of all field-based activities.

The level of oversight should be risk-based, and at minimum consider the weather patterns affecting the survey, the amount and magnitude of the 'obstacles' in the survey area, the terrain being over flown, the height of the survey, the ambient temperature, camp conditions and other fatigue-related factors.

Once considered, the means of oversight is to be documented and briefed as part of the mobilization plan.

evidence



The aircraft operator should document the risk assessment and the factors taken into consideration.

41.0: Aircraft Equipment

Certified and appropriate equipment must be fitted and serviceable prior to departure on a survey flight

41.1: Turbine Engines

Ensuring sufficient reliability and performance capability is available throughout survey operations.

All aircraft used in airborne geophysical operations must be equipped with turbine engines.

The performance and reliability advantages of turbine engines over piston engines are well documented. Piston engine helicopters and piston engine fixed-wing aircraft are not to be used for survey activities.



The aircraft operator must present only turbine powered aircraft for review during the BARS audit process.

41.2: Aircraft Canopy

Ensuring aircraft canopies allow safe operations and reduced flight crew workload.

To facilitate good lookout and field-of-view, the aircraft canopy and all transparencies must be clear, 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.



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.

41.3: Upper Torso Restraints

Ensuring aircraft occupants survive a crash impact.

Four-point upper torso restraints with lockable inertial reels must be provided to all aircraft occupants when an approved modification is available for the aircraft type.

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.



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.

41.4: Oxygen Supply

Ensuring aircraft oxygen systems are properly maintained and available to flight crew when required for safe operations.

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.



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

41.5: Supplemental Type Certificate (STC)

Ensuring all modifications to survey aircraft are in accordance with approved engineering data.

MNT 7.04.01

All role-specific equipment must be installed under an STC or Engineering Order.

Geophysical equipment can often invalidate the aircraft's certification basis due to the modifications required to the basic aircraft design. When 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.

41.6: Radio Altimeter

MNT 7.04.03

Ensuring the provision of reliable RADALT data and warnings to provide clear and reliable awareness of height above terrain/water.

Equip the aircraft with either a dual output radio altimeter or two independent radio altimeters when flown with two-pilots, or a single radio altimeter when flown single-pilot. The radio altimeter/s are to be fitted with visual and aural height warnings, and a variable height alert that can be set by the crew.

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. Laser altimeters are considered a suitable alternative to radio altimeters.

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.

41.7: Helicopter Flotation Equipment

MNT 7.04.10

Ensuring successful egress of all personnel can be made in the event of inadvertent water landing.

When a helicopter is operated beyond autorotative distance from land it must be equipped with fixed or deployable flotation devices.

Conduct of over water helicopter surveys require controls to be in place to manage the risk of inadvertent water impact. Having flotation devices that allow the aircraft to remain upright and above water will maximize the successful egress and survival of all crew members.



The aircraft operator should have appropriate policy and procedures relating to the fitment of helicopter flotation equipment.

41.8: Securing Cockpit Equipment

Ensuring additional survey equipment is properly fitted and secured and does not impede safe operations.

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.

Most airborne geophysical platforms are modified to carry additional sensor and acquisition systems. These modifications often result in a variety of extra monitoring equipment being installed within the cockpit environment. It is important that this equipment is secured properly and does not adversely affect cockpit ergonomics.



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.

41.9: Aircraft Heater and Air Conditioning

Ensuring that use of the aircraft heater or air conditioning is unrestricted.

The use of an aircraft heater or air conditioning must not be restricted for crew use in the interest of 'clean' data.

Some aircraft operators conducting airborne geophysical surveys have asserted that crew use of aircraft heating and cooling systems causes apparent interference with onboard survey apparatus and have therefore restricted the use of such systems for crew comfort.

Extreme temperatures (both warm and cold) present problems for both crew and equipment and can have a detrimental effect on safety due to exacerbating crew fatigue. Therefore, their use during survey operations should be unrestricted.



The aircraft operator must document in the Operations Manual that use of the heater and air conditioning is unrestricted throughout the flight envelope associated with survey operations.

41.10: Aircraft Radios and Transponder

Ensuring essential safety equipment remains ON throughout the survey.

Radios and transponders must remain ON throughout the conduct of the survey.

Monitoring of the correct ATC or area frequency at the same time transmitting transponder location will maximize situational awareness and position notification as well as satisfying flight following requirements.



The aircraft operator must document in the Operations Manual that radios and transponders must remain ON during survey operations.

42.0: Survey Towed Device

Lifting equipment fails and the survey load drops to the ground causing an accident

42.1: Helicopter External Load Requirements

Ensuring compliance with the safety requirements of external load operations.

Helicopter external load equipment such as towed arrays must follow all requirements contained within Appendix 4.

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.

42.2: Weak Links

Ensuring safe flight can be maintained in the event of towed arrays being snagged.

Where a survey device is towed, install an approved weak link in the line that is certified for the purpose by the responsible regulatory authority and/or approved design/manufacturer facility.

The weak link mechanism should be life limited with a specified replacement schedule once placed into service.

For helicopters the weak link must be positioned at the belly hook end of the cable nearest the helicopter. For fixed-wing aircraft it must be located near the device since it is winched in and out of the aircraft.

The weak link should be able to withstand the load from the survey equipment in-flight, while having a breaking point lower than that of the airframe or cargo hook.

The device's data and power cables should be fitted in a similar manner with a suitably frangible link that releases from the aircraft when subjected to excessive force and will also separate safely from the helicopter if the towed array is jettisoned by the pilot.

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.



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.

42.3: Inspection Program

Ensuring early detection of impending failure of survey equipment.

FLT 7.03.01
MNT 7.04.05

A documented inspection program approved by the Original Equipment Manufacturer (OEM) and/or design authorities must incorporate the following requirements:

- *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 Loadmaster, 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.

42.4: Sling Equipment

Ensuring early detection of impending failure of sling cable assemblies.

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 42.3 for additional explanation.)

42.5: Synthetic Cables

Ensuring safe of operation of synthetic sling cables if utilized.

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.

43.0: 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)

43.1: Risk Assessment

Ensuring all risks associated with geophysical operations are analyzed, minimized and accepted.

Aircraft operator must complete the IAGSA Risk Assessment which addresses all controls contained within the FSF BAR Standard.

Before commencing operations, the aircraft operator should undertake a comprehensive risk assessment process using the IAGSA template to review all activities associated with a proposed survey operation. With the collaboration between IAGSA and the FSF, this will ensure all relevant BARS controls are covered in addition to meeting IAGSA expectations. The completed risk assessment should be reviewed by a competent aviation specialist on behalf of the contracting company.



The aircraft operator's Safety Management System should detail the requirement for the assessment and management of operational risks as an integral part of planning and conduct of operations. The latest version of the IAGSA Risk Assessment Tool should be specified as the template that will be used by the operator.

43.2: Pre-survey Reconnaissance Flight

Ensuring low level survey flight is conducted with an awareness of all obstacles that pose a threat.

Prior to commencing any new project, a pre-survey reconnaissance flight (or flights) will be conducted at a safe altitude with the aim of confirming estimated canopy height, identifying legal and illegal wire constructions, towers, structures and any object that could be considered a hazard to aircraft operating in the low-level flight regime. The information gained must be used to validate the risk assessment and, where necessary, changes made to flight operations planning.

The IAGSA Reconnaissance Flight Checklist is presented in Annex F to the Implementation Guidelines.

Operations that are to be conducted at low level have a heightened level of risk associated with potential aviation hazards such as powerlines and uncharted obstacles. A reconnaissance flight must be undertaken at a safe height to identify all hazardous obstructions and areas that should be avoided prior to committing to conduct of low-level survey operations.

Where wires are a known hazard, every opportunity to conduct 360° orbital reconnaissance should be made to identify wires in all light conditions.

The operator must ensure that adequate means are in place to communicate relevant findings from the pre-survey reconnaissance flight to all pilots associated with the operation.



The aircraft operator's risk assessment should detail the requirement for a pre-survey reconnaissance flight to be conducted prior to commencement of low-level survey flight operations to mitigate the risks associated with low-level operations.

The scheduling of survey operations should provide for ample opportunity for completion of a comprehensive reconnaissance flight over the planned survey area prior to commencement of operations.

43.3: RPAS Simultaneous Operations (RPAS SimOps)

Ensure all known Remotely Piloted Aircraft Systems (RPAS) operations conducted in the survey area of operations are made aware of the impending low-level geophysical activity.

Where RPAS (drones) activity is anticipated, such as in the vicinity of production mine sites, port areas or along pipeline/ powerline routes, the aircraft operator is to advise all known RPAS users of their operations and reference FSF RPAS Simultaneous Operations (Simops) protocol articulated in RPAS Standard Annex A Model of Separation Standards.

Due to the low-level nature of many airborne geophysical survey operations, it is imperative that pre-survey planning involves consideration of possible RPAS operations and the associated conflicts this may create.

Aircraft operators must engage with all known RPAS Operators during the planning stages of a geophysical survey operation. Any potential conflict of operations can then be factored into the run plans of the survey(s) by providing deconflictions based on physical separation (lateral or altitude) or time-based separation.



The aircraft operator should demonstrate that pre-survey stakeholder engagement of RPAS Operators is incorporated into their pre-survey planning and operational risk assessment (ORA). Policy and/or procedures should document this requirement and it should be evidenced in the Operator's survey ORAs.

43.4: Aircraft Survey Simultaneous Operations (Survey SimOps)

Ensuring simultaneous aircraft operations are well planned, briefed, executed and assessed post-flight for maintenance of separation and mutual support.

All simultaneous operations involving aircraft are to be risk-assessed, briefed and operated in accordance with the derived plan. Furthermore, post-flight debriefing critical to the following days SimOps activities must be conducted at the conclusion of flight operations daily.

The conduct of SimOps demands an additional level of oversight and planning. The IAGSA template for a SimOps plan is presented in Annex G to the implementation Guidelines. Worked examples may be obtained from IAGSA on request.



The aircraft operator should demonstrate that the pre-operation risk assessment and planning considers all facets of simultaneous operations with particular emphasis on communications and separation requirements.

43.5: Minimum Survey Heights

FLT 7.05.03
ORG 3.04.06

Ensuring surveys are conducted at a safe height after consideration of all factors including terrain and aircraft type.

The survey height is defined as the height above obstacle level which can include tops of a jungle canopy, height of tree-tops or ground level in desert/arid conditions. The obstacle level should always be determined using the highest obstacle/tree height known.

Where the survey height is nominated below 100 meters for fixed-wing, 60 meters for helicopters or 50 meters for a towed object, the following steps must be documented:

- The client company (BARS Member Organization BMO) must model what the highest altitude is that will still achieve the target. This height is to be used for planning and tendering purposes;*
- The BMO, when setting the survey height, must risk assess the viability of that height and use qualified aviation personnel as part of the RA team. This must be conducted prior to issuing the tender for services; and*
- Final approval to proceed must be agreed to by BMO, survey company and aircraft operator.*

The minimum survey height is the fine line between ensuring adequate data is achieved through the survey, balanced with an operating height above obstacles that ensures a safe flight envelope is maintained throughout.

Determination of that height should be established through risk assessment, taking into account all environmental factors combined with a realistic height that can achieve the data quality. Once this height is known, the tender should be released so that survey companies and aircraft operators can plan accordingly.



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.

43.6: Transit Altitude

FLT 7.05.04
ORG 3.04.06

Eliminating the risks associated with low level operations when low level operations are not necessary.

Transit altitude must be above 500 feet above ground level.



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.

43.7: Survey Speed – Fixed-wing

Ensuring appropriate survey speeds are calculated for fixed-wing aircraft to allow safe control margins.

FLT 7.05.06
ORG 3.04.06

For all fixed-wing aircraft the minimum safe survey speed must be calculated using the greater of:

- *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.

43.8: Survey Speed – Rotary-wing

Ensuring appropriate survey speeds are calculated for rotary-wing aircraft to allow safe control margins.

FLT 7.05.06
ORG 3.04.06

The helicopter should have the capability to hover out of ground effect (OGE) at any location in the survey area using the planned temperatures and operating weights.

To ensure adequate performance margins are maintained during departure from the operating base, payloads are to be reduced to 90% of that permitted in the HOGE chart.

If a helicopter cannot maintain either a positive 400 feet per minute rate of climb or the designated airspeed for the respective towed array, the line should be discontinued.

Any decision to rejoin the survey line solely remains the pilot-in command and based on an assessment of the ambient conditions at the time.

In addition to the requirements outlined above, consideration to remaining outside the avoid curve of the aircraft type being operated should be given. Operations inside the avoid curve provide no guarantee of a safe outcome in the event of an engine failure and 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, this must be addressed in the pre-start risk assessment.

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.

43.9: Turning Radius

FLT 7.05.07

Ensuring appropriate limitations on aircraft turns during surveys.

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.



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.

43.10: Night Instrument Flight Rules (IFR)

Ensuring night surveys are conducted safely and in accordance with Instrument Flight Rules.

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 than day surveys. They must always be flown at or above the applicable safety altitude and follow full IFR requirements.



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.

43.11: Minimum Temperature

FLT 7.05.08

Reducing crew fatigue by ensuring survey operations are not conducted in extreme temperatures.

The minimum ground temperature for operations must be at or warmer than –35 Degrees Celsius.

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.



The aircraft operator must document in the Operations Manual a minimum ground temperature of –35 degrees C.

43.12: Performance Monitoring

Ensuring compliance with minimum survey parameters.

Performance parameters including aircraft speed, height above terrain and drupe must be periodically reviewed using data collected during the survey. Inspect deviations below minimum survey speed and minimum height. Corrective actions must be taken to ensure deviations cease and the minimum safety margins are maintained. Determine the frequency of performance parameter reviews during the pre-start risk assessment.

Aircraft performance parameters (aircraft airspeed, height above terrain, and flight attitude) should be reviewed by the flight operator, analyzed and communicated to flight crew for continual improvement.

Deviations below minimum survey parameters should be investigated, and corrective action taken to ensure that safety margins are not compromised.

Flight Data Monitoring (FDM) data should be collected during all flight operations: including survey flights (including offline time), positioning ferries, and training flights.

The validation, review and communication to the pilot should be such that any discrepancies or lack of aircraft performance on a particular survey, by a particular pilot or by a particular aircraft type can be identified as early as possible.

FDM system should be integrated into a company's SMS as a "reporting node" and have means of validating, reviewing, and communicating events to flight crew with the aim of continual improvement.

FLT 7.05.13
ORG 3.04.06



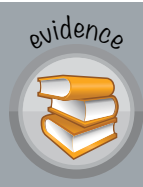
Post flight review reports should be available for inspection to confirm that minimum survey parameters are being complied with.

43.13: Reflights

Ensuring risk assessments for obstacles and localized conditions are validated for any reflights associated with infill or incomplete/broken lines at completion of the survey.

Flight crew are to brief, and risk assess, any reflight activity associated with infill or completion of broken lines. A final risk assessment is to be conducted at safe height prior to commencing the activity airborne.

Reflights at the end of a survey can represent some of the greatest risks associated with survey flying. Cumulative fatigue towards the end of a survey, a desire to complete the assignment and return home combined with flying an aspect of the survey that may have differed from the standard line flying preceding it all combine to make a unique situation that demands a specific risk assessment prior to conduct.



The aircraft operator must document in the Operations Manual reference to the risk-based approach undertaken prior to any reflight activity.

43.14: Offshore Surveys

Ensuring over water surveys take into account additional safety controls.

Offshore surveys, where the majority of the survey is over water, require additional controls. Include the following:

- *Underwater Escape training for all crew in the preceding three years;*
- *Ten hours of initial offshore survey training with a pilot who has had previous 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 one 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.



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.



Courtesy: Skyhorse Aviation

44.0: 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

44.1: Single-pilot Flight and Duty Time

Ensuring single-pilot fatigue is minimized.

FLT 1.04.05

For single-pilot geophysical survey operations, the maximum number of flight hours and duty time is outlined in Table 2.

Provided that the flight crew member meets or exceeds the following:

- 300 hours of documented geophysical survey experience;
- 2000 hours total time as pilot-in-command;
- 300 hours on the specific aircraft type; and
- A 'Low' (green) rating on the IAGSA Project Fatigue Risk Assessment Tool (FRA) then the single-pilot extension limits outlined in Table 2 may be applied.

Where the IAGSA FRA is rated 'Medium' (amber), all stakeholders (BMO, aircraft operator, survey company and flight crew) must all agree to the extension prior to it being used.

A 'High' (red) rating precludes the use of any extensions for the duration of the survey.

Survey flight operations are more fatiguing than normal flight operations due to the high levels of concentration required to maintain precise tracking requirements at low-level and in the presence of obstacles.

Compliance with the survey flight and duty times will minimize potential onset of fatigue.

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 comply 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.

Table 2: Flight and Duty Times

	Standard	Extension
Single-pilot		
Maximum daily flight time	8	8
Maximum flight hours per day on survey	5	7
Maximum flight hours per flight (excluding transit)	-	5
Maximum flight hours in seven day period	40	45
Maximum flight hours in 30 days	100	120
Maximum flight hours in calendar year	1000	1000
Dual pilot		
Maximum daily flight time	10	No Extension
Maximum flight hours per day on survey	8	
Maximum flight hours per flight (excluding transit)	-	
Maximum flight hours in seven day period	45	
Maximum flight hours in 30 days	120	
Maximum flight hours in calendar year	1200	
All pilots		
Maximum duty day	14	No Extension
Minimum hours of consecutive rest ⁽¹⁾	10	
Minimum consecutive days free from duty	2 days in 14	

(1) In addition to ten hours rest period, included in this rest period shall be the provision for at least eight hours of uninterrupted prone rest, and in suitable accommodation.

44.2: Two-pilot Flight and Duty Time

Ensuring multi-crew fatigue is minimized.

Table 2 outlines all two-pilot flight time limits.

Two-pilot fatigue considerations are more relaxed than single-pilot as it considers the sharing of duties within the cockpit during all phases of flight. Like single-pilot operations, 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.

44.3: Fatigue Management Considerations

Ensuring flight crew fatigue is minimized by appropriate management and pre-start risk assessment.

ORG 3.04.06

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;*
- *Survey specifications (height, contour flying, line length, frequency of turns);*
- *Flight activity (terrain, obstacles, ATC requirements);*
- *Camp conditions; and*
- *Rest facilities.*

To fully understand all factors affecting crew fatigue, the pre-start risk assessment must consider all elements noted above.

evidence



A copy of the risk assessment should be made available for review and be endorsed by a Competent Aviation Specialist prior to commencement of the survey operation.

44.4: Accommodation

Ensuring flight crew fatigue is minimized by the provision of appropriate accommodation.

ORG 3.04.06

Appropriate accommodation, including non-share single rooms when practical, 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. When the selected accommodation does not provide adequate rest facilities, alternative accommodation should be sourced.

49.0: Defences

Mitigating defences in the event of an accident during survey operations

49.1: Satellite Flight Following

Ensuring that survey aircraft are equipped with satellite flight following and that appropriate back-up voice procedures are in place.

All survey aircraft must be tracked during survey using a satellite-based tracking system set at one minute reporting intervals and which is continuously monitored real time 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.



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.

49.2: Local Flight Following

Ensuring the survey aircraft are subject to an appropriate flight following regime.

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.

49.3: Emergency Response Procedures

Ensuring adequate SAR and emergency response services are available in a timely and adequately resourced manner.

Emergency Response Procedures must be developed for each survey and be included as part of the pre-start operational risk assessment. Where localized Search and Rescue (SAR) capability is not available and the area is considered 'hostile', consideration into establishing an integral SAR capability must occur during the 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.

ORG 3.04.06

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.

49.4: Crew Clothing

Ensuring that flight crew protective clothing is appropriate to the operating conditions and environment.

All crew must wear appropriate clothing for survey operations including:

- *Minimum long trousers and long sleeved shirt but preferably nomex/flash proof 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.



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.

49.5: Crew Helmets

FLT 7.05.11
ORG 3.04.06

Ensuring flight crew conducting extended low level operations have appropriate head protection.

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.



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.

49.6: Survival Kit

Ensuring that in the event of an emergency, aircraft occupants have access to equipment and supplies to aid survival.

Carry a survival kit 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.

MNT 7.04.09



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.

49.7: Life Jackets

FLT 7.05.12

Ensuring that in the event of an aircraft ditching, occupants can survive in the water.

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.



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.

49.8: Liferafts

Ensuring that in the event of an aircraft ditching, occupants can survive in a liferaft.

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.

49.9: Underwater Escape Training

Ensuring that in the event of a helicopter ditching, occupants can survive if the helicopter submerges and/or capsizes.

FLT 7.02.02

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 three years (unless local regulation requires greater frequency).

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).



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.

49.10: Crew Personal Locator Beacon (PLB)

Ensuring timely alerting and location identification to aid SAR services.

Crew operating in hostile environments must have access to a Personal Locator Beacon (PLB) that is either voice-capable or is accompanied with a satellite phone.

The requirement for crew to have a PLB that is either voice-capable, or accompanied by satellite phone, as a mitigation control 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.



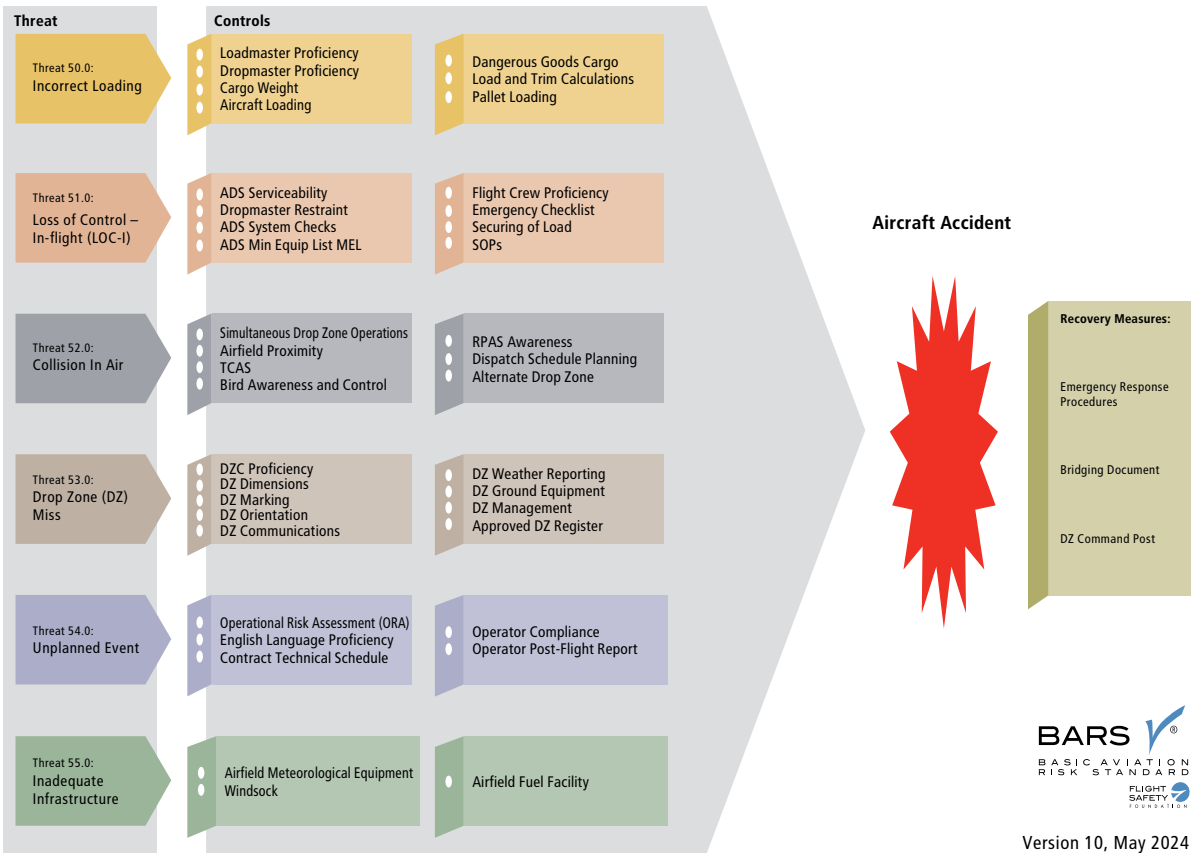
Where an aircraft operator undertakes operations in hostile environments, the Operations Manual should contain requirements for crew to carry a voice-capable, GPS PLB on their person.

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.

Appendix 7: Air Drop

Figure 10: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and Recovery Measures for Air Drop.



Courtesy: UNWFP

50.0: Incorrect Loading

Incorrect loading of the aircraft results in an accident

50.1: Loadmaster Proficiency

Ensuring the crew members are proficient and current for the operational roles assigned.

Loadmasters must be employed by the aircraft operator and their proficiency tracked through the aircraft operators system of training and checking. Qualifications, experience and recency listed in Table 3 must be met.

50.2: Dropmaster Proficiency

Ensuring the crew members are proficient and current for the operational roles assigned.

Where Dropmasters are utilized in addition to a Loadmaster, the aircraft operator must have a documented approval process in place for each Dropmaster pertaining to the air delivery system in use. Experience requirements in Table 3 apply.

50.3: Cargo Weight

Ensuring accurate cargo weights for air drop operations.

Bags prepared for aerial delivery must meet the nominated weight specification to avoid inadvertent overloading of the aircraft. Check a sample of bag weights (minimum 5% for each aircraft load) using calibrated scales located at the bagging facility prior to delivery to the aircraft. Confirmation of the sampling undertaken must accompany the waybill when provided to the Loadmaster.

50.4: Aircraft Loading

Ensuring the aircraft is loaded correctly and in accordance with qualified crew instructions.

Aircraft must be loaded by personnel trained in aircraft loading and who are supervised by a Loadmaster and/or member of the flight crew at all times.

50.5: Dangerous Goods Cargo

Ensuring DG are handled and loaded correctly and by qualified and current crew.

Cargo must comply with current IATA requirements associated with Dangerous Goods Regulations. All flight crew and Loadmasters must complete dangerous goods awareness training at least every 2 years.

50.6: Load and Trim Calculations

Ensuring the aircraft remains within published W&B limits for all phases of flight.

The Pilot-in-Command must ensure the weight and center-of-gravity for the flight are within limits prior to takeoff, and are maintained during loading and dropping for full or partial load delivery operations.

50.7: Pallet Loading

Ensuring the security and stability of palletized cargo throughout the flight and drop.

The bags prepared for dropping are required to be systematically arranged on each pallet to remain stable in-flight and during the delivery phase over the Drop Zone. Depending on the commodity being carried (cereal, pulses, CSB++ etc) this may mean the number of bags per pallet is limited for security and stability purposes. The Loadmaster is responsible for ensuring the pallet construction remains stable throughout all phases of flight.

Table 3: Crew Member (Qualifications, Experience and Recency)

Crew Member	Qualifications	Experience and Recency
Pilot-in-Command	UNAVSTADS Table 4.2.4 and 4.2.5 Completed an initial documented air drop course provided by the AOC holder. Annual simulator training including procedural air drop and associated emergencies.	Five actual air drops on contract aircraft type. These may be achieved on contract (revenue flights) if operating with oversight of respective company standardization Pilot, Navigator, Loadmaster or Dropmaster (whichever applicable) for all five flights and assessed on completion. See Note 1 below Crew Line Proficiency Check conducted annually (revenue flight) using company designated standardization Pilot, Navigator, Loadmaster and Dropmaster.
Co-pilot		
Navigator		
Flight Engineer		
Radio Operator		
Loadmaster		
Dropmaster	Approved training course in the Air Drop System in use.	

Note 1: Drop zones must meet minimum dimensions outlined in the WFP Air Drop Field Manual and operator's published and approved dimensions, whichever is more restrictive, for the Captain and Navigator position undergoing their first five drops.

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

Crew actions and/or a non-standard load release place the aircraft outside the normal flight envelope leading to an unrecoverable flight condition

51.1: Air Drop System (ADS) Serviceability

Ensuring the ADS remains serviceable via inspection and regular servicing.

The Air Drop System (ADS) on the aircraft must conform to the Original Equipment Manufacturer (OEM) servicing schedule that provides all necessary documentation associated with inspections, certification and serviceability. Copies of the servicing schedule must be made available in English.

51.2: Dropmaster Restraint

Ensuring the protection of the dropmaster during ramp open flight.

Dropmasters must have an acceptable means of fall restraint that secures them to the aircraft anytime the ramp is open.

51.3: ADS Preflight System Checks

Ensuring the ADS is fully operational pre-departure.

The aircraft ADS must be inspected by qualified personnel prior to each operational flight and using the servicing schedule outlined in 51.1. Any indication of unserviceability must be brought to the attention of the Pilot-in-Command prior to departure.

51.4: ADS Minimum Equipment List (MEL)

Ensuring the ADS is functionally operational pre-departure.

The aircraft ADS must have a Minimum Equipment List (MEL) documented so that a clear Go/No-Go decision can be made by the Pilot-in-Command in the event any part of the system is not serviceable.

51.5: Flight Crew Proficiency

Ensuring the flight crew are proficient and current for the operational role.

Flight crew must meet the qualifications, experience and recency listed in Table 3.

51.6: Air Drop Emergency Checklist

Provision of standard procedures for non-normal and emergency situations are available to the crew and they are proficient in the understanding of such.

All Crew Members must have access to emergency checklist associated with Air Drop System malfunction and have received initial and recurrent proficiency training in accordance with Table 3.

51.7: Securing of Load

Ensuring the load is secured in a timely fashion before departure.

Prior to taxi, all loads must be secured in accordance with prescribed loading and restraint schemes applicable for the size, weight and composition of the load.

51.8: Standard Operating Procedures (SOPs)

Provision of acceptable SOPs for the operational role and local environment/location.

The aircraft operator must have written Standard Operating Procedures accepted by the Authority outlining all crew actions engaged in the delivery of air drops. These procedures must be relevant to the local environment operated in as well as stores being delivered.



52.0: Collision in Air

An aircraft and object collide in air resulting in an accident

52.1: Simultaneous Drop Zone Operations

Ensuring effective separation of other traffic around air drop operations.

If air drop operations to multiple Drop Zones that are within close proximity to each other (< than 20nm) are required, precise planning to ensure de-confliction of aircraft must occur. This may require restrictions on circuit direction, timing of drops, number of aircraft arriving at the same time or a combination of all three factors. The UNHAS Tasking Officer will coordinate this with all aircraft operators involved.

52.2: Airfield Proximity

Ensuring effective separation of other traffic around air drop operations.

Drop Zones should not be planned within 5nm of an airfield. If operational needs necessitate a closer drop distance (less than 5nm), the activity must be risk assessed and at minimum all inbound and outbound traffic must stop during the duration of the air drop.

Other References:

RPAS Implementation Guidelines

52.3: Traffic Collision Avoidance System (TCAS)

Ensuring timely detection of conflicting air traffic to enable correct avoidance maneuvers and avoidance of other traffic.

Regardless of MEL allowances, the aircraft TCAS and at least one TCAS indicator, must be serviceable for all air drop missions.

52.4: Bird Awareness and Control

Ensuring flight crew awareness of known bird hazards.

The DZ Coordinator should provide advisory information to the aircraft anytime birds are in the area and considered a hazard at aircraft drop height (600 – 800 feet above ground level).

52.5: Remote Piloted Aircraft System (RPAS) Awareness

Ensuring flight crew awareness of known RPAS operations.

Flight crew must be briefed on any proposed RPAS activity at the departure aerodrome, en route and in the vicinity of the Drop Zone. Where necessary, coordination procedures ensuring separation should occur prior to departure.

52.6: Dispatch Schedule Planning

Ensuring effective and thorough planning with external parties prior to air drop operations.

When developing the schedule for air drop activities, awareness of all relevant parties conducting aviation activities in the area must be coordinated. This will include, but not be limited to, military organizations, national aviation authorities, national airspace authorities, other civil aid agencies, operators of Remote Piloted Aircraft Systems (RPAS) and ground-based aid organizations active in the DZ area.

52.7: Alternate Drop Zone

Ensuring effective planning to provide a suitable alternate DZ.

Where the suitability of a DZ is compromised by conflicting aviation activity and/or any safety-related reason, pre-briefing of an alternate drop zone may be planned so that any late changes to DZ location can be managed whilst achieving all operational risk assessment requirements beforehand. All necessary approvals required for DZ's must similarly be in place before accepting an alternate DZ.



53.0: Drop Zone (DZ) Miss

A deployed load misses the Drop Zone resulting in a fatality on the ground

53.1: DZ Coordinator Proficiency

Ensuring the provision of suitable qualified ground crew in the DZ.

Drop Zone Coordinators (DZC) must have completed initial training that includes the WFP Air Drop Field Manual as part of the curriculum.

53.2: DZ Dimensions

Ensuring the DZ meets minimum dimension criteria.

The dimensions of the DZ must meet the minimum requirements of the aircraft type being used for delivery. Where differing dimensions are provided (eg between WFP and aircraft operator), the greater of the dimensions shall be used.

53.3: DZ Marking

Ensuring the flight crew can readily and clearly identify the correct DZ.

Marking of the DZ by the DZ Coordinator shall be conducted and will assist in visual sighting by the flight crew. Marking requirements by aircraft and operation type are contained in the WFP Air Drop Field Manual.

53.4: DZ Orientation

Ensuring the DZ is oriented for safe entry/exit by the dropping aircraft.

Where possible, the DZ should be oriented to allow for the aircraft to approach into prevailing wind conditions. When these are not known, or not a factor, a North-South direction or alignment with surrounding terrain/vegetation should be used.

53.5: DZ Communications

Ensuring a primary and secondary means of air-ground DZ communication.

The DZ Coordinator must have ground-to-air radio (VHF-AM) radio with back-up radio in addition to satellite telephone with back-up. A reliable means of battery recharging and/or a suitable number of spare batteries must be held on-site for the expected duration of the drop mission.

53.6: DZ Weather Reporting

Provision of accurate wind information to the crew prior to drop.

The DZ Coordinator must have a means of measuring wind speed and direction and provide that information to the aircraft prior to commencement of the air drop.

53.7: DZ Ground Equipment

Ensuring suitable DZ equipment prior to the drop.

The DZ Coordinator must have a complete and serviceable inventory of Drop Zone Equipment as outlined in the Air Drop Field Manual.

53.8: DZ Management

Protection of locals during the drop.

The Drop Zone must be secured to ensure the local community or livestock remain clear of the area during air drop operations.

53.9: Approved DZ Register

Creation of a collaborative and efficient register.

Document approved Drop Zones on a DZ register that is readily available to both the Humanitarian organizations and the aircraft operators performing the drops.



54.0: Unplanned Event

An unexpected event occurs that catches the flight crew and/or the DZ Ground Coordinator by surprise and results in an accident

54.1: Operational Risk Assessment (ORA)

Ensuring a thorough and effective risk management process.

Prior to operating to a new DZ, conduct an ORA (or similarly named approval process) involving DZ Coordinators, Humanitarian organization and the aircraft operator.

54.2: English Language Proficiency

Ensuring clear and unambiguous communication between the DZ and flight crew.

The Drop Zone Coordinator (DZC) and the flight crew member responsible for communications must have demonstrated English Language Proficiency (Level 4 as a minimum) for radiotelephony communication in accordance with ICAO Aviation English Language Test Services (AELTS).

54.3: Contract Technical Schedule

Ensuring well defined legal contracts are in place.

The technical requirements outlined in the Air Drop Standard must be included as a technical schedule to the contract with the aircraft operator.

54.4: Aircraft Operator Compliance

Ensuring contracted operators and crews are familiar with international standards for air dropping.

The aircraft operator must have procedures and verification processes to make sure all operating crew understand and agree to all requirements contained within the contract technical schedule.

54.5: Aircraft Operator Post-Flight Report

Ensuring a feedback mechanism for continuous improvement.

A post-flight report is to be completed by the Pilot-in-Command and Drop Zone Coordinator after each air drop mission and provided to the local UNHAS representative.

55.0: Inadequate Infrastructure

Poorly maintained or inadequate/absent infrastructure results in an accident on departure or arrival

55.1: Airfield Meteorological Equipment

Ensuring suitable weather information is available to the crew for departure and arrival airports.

For all airfields where aircraft involved in air drop operations operate from, provide the following information from calibrated equipment before every takeoff and landing:

- *Wind direction and speed;*
- *Barometric pressure; and*
- *Temperature.*

Cloud ceiling height and visibility information is highly desirable for arriving aircraft, particularly in areas of inclement weather as experienced during wet seasons.

55.2: Windsock

Ensuring suitable weather information is available to the crew for departure and arrival airports.

A minimum of one serviceable windsock is to be maintained throughout an air drop campaign at the airfield where the air drop aircraft are operating from.

55.3: Airfield Fuel Facility

Ensuring suitable fuel supplies are available in support of air drop operations.

Prior to operational start-up, the aircraft operator is to conduct a review of the fuel facilities providing fuel for operations to determine acceptability.



59.0: Defences

Mitigating defences in the event of an accident

59.1: Emergency Response Procedures

Provision of suitable and relevant ERP for all stakeholders involved with the air drop operation.

All organizations involved in an air drop must have up-to-date Emergency Response Procedure appropriate for an in-flight or on-ground emergency as a result of an air drop. This will include WFP Logistics, the aircraft operator, UNHAS and WFP ASU.

59.2: Bridging Document

Ensuring suitable communications are in place for each air drop operation.

A bridging document detailing the lines of communication between aircraft operator, WFP Logistics and UNHAS must be made available for each air drop activity.

59.3: DZ Command Post

Ensuring the DZ command post is established and functionally capable of initiating the emergency response.

A DZ Command Post must be established for all air drop activities and ideally be situated upwind of the drop zone and outside the exclusion zone. The Command Post must have line-of-sight of the DZ, hold all communications with ground and air resources and be in a position to initiate emergency response if required.





Courtesy: Cobham Aviation Services

Annexes

Annex A: Hostile Environment Considerations

Considerations for determining Hostile v Non - Hostile terrain

Hostile terrain:

1. An environment in which a successful emergency landing cannot be assured; or
2. The occupants of the aircraft cannot be adequately protected from the elements; or
3. Search and rescue response/ capability cannot be provided consistent with the anticipated exposure.

Note: successful emergency landing is defined as a landing that may render the aircraft unusable (belly landing, blade damage, skids spreading), but which the occupants can survive.

Pre-Impact:

Can a successful emergency landing be assured?

Fixed Wing

Sufficient altitude to enable aircraft to glide to non-hostile area	Y	N
Sufficient clear ground (length and width) to conduct a successful emergency landing (see above emergency landing definition)	Y	N
Light scrub or trees (see above emergency landing definition)	Y	N
Flat, smooth or slightly undulating ground	Y	N
Hard packed snow	Y/NA	N
Ice sufficiently thick to withstand landing weight	Y/NA	N
Operation over water (depth greater than two meters)	Y	N
Are there any security issues on the ground that could cause harm to occupants?	Y	N

Rotary Wing

Sufficient altitude to enable aircraft to auto rotate to non-hostile area	Y	N
Sufficient clear ground (length and width) to permit successful autorotation	Y	N
Flat or less than seven degrees slope	Y	N
Surface condition firm	Y	N
Ice sufficiently thick to withstand landing weight	Y/NA	N
Operation over water (depth greater than two meters)	Y	N
Planned flight operations above 500 feet AGL (height/velocity diagram noted)	Y	N
Are there any security issues on the ground that could cause harm to occupants?	Y	N

Post Incident

Can the occupants be adequately protected from the elements until help arrives?

Assumes occupants have access to:

Shelter (natural or tarp), sufficient water (two litres per person per day) and food to sustain them consistent with the exposure;

Medical kit - comprehensive and suitable for the operational environment; and

Adequate first aid training (sufficient to manage injuries consistent with an aircraft crash and the operational environment (ie snake/ Insect bite, heat stroke, Hypothermia, frost bite).

Emergency Response

Response (at any stage of the flight) can achieve the following time limitations:

Below -15 degrees Celsius (5 degrees Fahrenheit) or above 37.5 degrees Celsius (100 degrees Fahrenheit) – within two hours; and

Above -15 degrees Celsius (5 degrees Fahrenheit) but below 37.5 degrees Celsius (100 degrees Fahrenheit) – within six hours.

For overwater flights, the risk of hypothermia should dictate response times.

Y

N

If any answer is **RED** and it is not possible to mitigate the risk adequately in the event of an engine failure, use of a twin-engine aircraft should be considered.

After completion of a risk-assessment and endorsed by an aviation specialist a single-engine turbine aircraft may be considered if the risks can be adequately managed.

Annex B: Competency – Based Training and Assessment

References:

ICAO Doc 9868 Training

ICAO Doc 9995 Manual of Evidence-Based Training

IATA Evidence-Based Training Implementation Guide

IATA White Paper - CBT Assessment Expansion within the Aviation System

Implementation of a competency-based training (CBT) framework provides an alternate training pathway for aircraft operators to follow to qualify crews for unrestricted operations and allows them to move away from the strict compliance requirements of Annex 1 of the BAR Standard. A functional CBT program will allow aircraft operators to augment their pilot workforce by progressively training and exposing pilots who do not meet the Appendix 1 compliance requirements to operations in accordance with a formal, documented, and controlled system. An aircraft operator's CBT framework must satisfactorily address applicable key training and assessment elements with each step of the process being clearly identified, documented and able to be objectively verified.

Aircraft operators electing to implement CBT and assessment shall adapt the corresponding ICAO competency framework to suit their operations.

Application of CBT aligns the development of skills and capabilities of pilots with the increasing levels of competence commensurate with the more demanding flying tasks associated with career progression.

Incorporation of a robust CBT program will provide transparency into the operator's training regime and provide necessary and auditable assurance and safeguards demanded by all stakeholders.

Element 1: Selection Process

The aircraft operator's CBT framework shall have a documented flight crew selection process that provides for selection of candidates for entry into the operator's CBT program based on demonstration of aptitude in conjunction with defined minimum entry qualification and experience requirements.

Element 1.1: Minimum Entry Qualifications and Experience

Ensuring candidates selected for entry into a CBT program meet minimum qualifications and experience requirements required for successful completion of the program.

Entry into an aircraft operator's CBT program requires candidates to meet defined minimum qualifications and experience that meets or exceed relevant National Aviation Authority requirements. Notwithstanding, if a candidate demonstrates exceptional skills and aptitude (see Elements 1.2 and 1.3) but not the Operator's defined minimums, the Operator may elect to waive this requirement with appropriate senior management review and approval. NAA minimum requirements must always be met.

Element 1.2: Candidate Skills Assessment

Ensuring candidates selected for entry into a CBT program possess necessary fundamental flying skills required for successful completion of the program.

Candidates for entry into an operator's CBT program will be subject to a flight check (either in a flight simulator or on aircraft) performed to an acceptable standard. Such an assessment must progressively introduce more involved sequences to be flown rather than a straightforward assessment of manipulative (visual and instrument) flying skills. The flight check will assess whether the candidate possesses necessary fundamental flying skills and flightpath management capability for entry into the CBT program.

Element 1.3: Candidate Aptitude Assessment

Ensuring that candidates selected for entry into an operator's CBT program possess appropriate aptitude.

The selection process for entry into the CBT program must include an assessment of whether the candidate possesses the necessary decision-making capability and learning aptitude to successfully complete all aspects of the CBT. This will be achieved as part of the initial flight check (Element 1.2) and/or be conducted through use of such tools as psychometric testing and candidate interviews.

Element 2: Competency Model and Core Competencies

Competency is a dimension of human performance used to reliably predict successful performance on the job. Competency is a combination of the knowledge, skills, and attitude required to carry out activities or tasks under specified conditions to a prescribed standard.

CBT is structured around nine defined Core Competencies (identified by ICAO and EASA) that are a group of related behaviours, based on task requirements, describing how to effectively perform a task and what proficient performance looks like. The following elements identify the core competencies and their related behavioural indicators, the purpose of which is to prescribe the performance expectations applicable in all stages of training throughout a pilot's operational and career progression.

Element 2.1: Definition of the Competency Model

Ensuring the aircraft operator has a clear definition of the applicable competency model.

Successful implementation of a competency-based training (CBT) program must have as a foundation a clear definition of the applicable competency model that includes:

1. The competencies to be developed by candidates; and
2. The competency standard that must be demonstrated to assess whether or not required individual competencies have been achieved.

Core Competency 1: Problem – Solving and Decision – Making

Ability to accurately identify risks and resolves problems through use of appropriate decision-making processes.

- Seeks accurate and adequate information from appropriate sources;
- Identifies and verifies what and why things have gone wrong;
- Employ(s) proper problem-solving strategies;
- Perseveres in working through problems without reducing safety;
- Uses appropriate and timely decision-making processes;
- Sets priorities appropriately;
- Identifies and considers options effectively;
- Monitors, reviews, and adapts decisions as required;
- Identifies and manages risks effectively; and
- Improvises when faced with unforeseeable circumstances to achieve the safest outcome.

Core Competency 2: Situational Awareness

Is able to perceive and comprehend all of the relevant information available and anticipates what could happen that may affect the operation.

- Identifies and assesses accurately the state of the aircraft and its systems;
- Identifies and assesses accurately the aircraft's vertical and lateral position, and its anticipated flight path;
- Identifies and assesses accurately the general environment as it may affect the operation;
- Keeps track of time and fuel;
- Maintains awareness of the people involved in or affected by the operation and their capacity to perform as expected;
- Anticipates accurately what could happen, plans and stays ahead of the situation;
- Develops effective contingency plans based upon potential threats;
- Identifies and manages threats to the safety of the aircraft and people; and
- Recognizes and effectively responds to indications of reduced situation awareness.

Core Competency 3: Workload Management

Manages available resources efficiently to prioritize and perform tasks in a timely manner under all circumstances.

- Maintains self-control in all situations;
- Plans, prioritizes, and schedules tasks effectively;
- Manages time efficiently when carrying out tasks;
- Offers and accepts assistance, delegates when necessary and asks for help early;
- Reviews, monitors, and cross-checks actions conscientiously;
- Verifies that tasks are completed to the expected outcome; and
- Manages and recovers from interruptions, distractions, variations, and failures effectively.

Core Competency 4: Application of Procedures

Identifies and applies procedures in accordance with published operating instructions and applicable regulations, using the appropriate knowledge.

- Identifies the source of operating instructions;
- Follows SOPs unless a higher degree of safety dictates an appropriate deviation;
- Identifies and follows all operating instructions in a timely manner;
- Correctly operates aircraft systems and associated equipment;
- Complies with applicable regulations; and
- Applies relevant procedural knowledge.

Core Competency 5: Flight Path Management – Automatic Flight

Controls the aircraft flight path through automation, including appropriate use of flight management system(s) and guidance.

- Controls the aircraft using automation with accuracy and smoothness as appropriate to the situation;
- Detects deviations from the desired aircraft trajectory and takes appropriate action;
- Contains the aircraft within the normal flight envelope;
- Manages the flight path to achieve optimum operational performance;
- Maintains the desired flight path during flight using automation whilst managing other tasks and distractions;
- Selects appropriate level and mode of automation in a timely manner considering phase of flight and workload; and
- Effectively monitors automation, including engagement and automatic mode transitions.

Core Competency 6: Flight Path Management – Manual Flight

Controls the aircraft flight path through manual flight, including appropriate use of flight management system(s) and flight guidance systems.

- Controls the aircraft manually with accuracy and smoothness as appropriate to the situation;
- Detects deviations from the desired aircraft trajectory and takes appropriate action;
- Contains the aircraft within the normal flight envelope;
- Controls the aircraft safely using only the relationship between aircraft attitude, speed and thrust;
- Manages the flight path to achieve optimum operational performance;
- Maintains the desired flight path during manual flight whilst managing other tasks and distractions;
- Selects appropriate level and mode of flight guidance systems in a timely manner considering phase of flight and workload; and
- Effectively monitors flight guidance systems including engagement and automatic mode transitions.

DRAFT for Industry Consultation

Core Competency 7: Communication

Demonstrates effective oral, non-verbal, and written communications, in normal and non-normal situations.

- Ensures the recipient is ready and able to receive the information;
- Selects appropriately what, when and how and with whom to communicate;
- Conveys messages clearly, accurately, and concisely;
- Confirms that the recipient correctly understands important information;
- Listens actively and demonstrates understanding when receiving information;
- Asks relevant and effective questions;
- Adheres to standard radiotelephone phraseology and procedures;
- Accurately reads and interprets required company and flight documentation;
- Accurately reads, interprets, constructs, and responds to messages in English;
- Completes accurate reports as required by operating procedures;
- Correctly interprets non-verbal communication; and
- Uses eye contact, body movement and gestures that are consistent with and support verbal messages.

Core Competency 8: Leadership and Teamwork

Demonstrates effective leadership and team working.

- Understands and agrees with the crew's roles and objectives;
- Creates an atmosphere of open communication and encourages team participation;
- Uses initiative and gives directions when required;
- Admits mistakes and takes responsibility;
- Anticipates and responds appropriately to other crew members' needs;
- Carries out instructions when directed;
- Communicates relevant concerns and intentions;
- Gives and receives feedback constructively;
- Confidently intervenes when important for safety;
- Demonstrates empathy and shows respect and tolerance for other people;
- Engages others in planning and allocates activities fairly and appropriately according to abilities;
- Addresses and resolves conflicts and disagreements in a constructive manner; and
- Projects self-control in all situations.

DRAFT for Industry Consultation

Core Competency 9: Application of Knowledge

Demonstrates knowledge and understanding of relevant information, operating instructions, aircraft systems and the operating environment.

- Demonstrates practical and applicable knowledge of limitations and systems and their interaction;
- Demonstrates required knowledge of published operating instructions;
- Demonstrates knowledge of the physical environment, the air traffic environment including routings, weather, airports, and the operational infrastructure;
- Demonstrates appropriate knowledge of applicable legislation;
- Knows where to source required information;
- Demonstrates a positive interest in acquiring knowledge;
- Is able to apply knowledge effectively.



DRAFT for Industry Consultation

Element 3: Evidence – Based Training

Data sources such as flight data analysis, flight observation (e.g. line operations safety audit [LOSA]) and air safety reports shall be used by the operator to identify training needs.

Available data sources give detailed insights into the threats, errors and risks that are present in flight operations and their relation to unwanted consequences and undesired aircraft states. Operators should utilize available safety and operational data throughout the CBT program to guide development of core pilot competencies and better prepare pilots to manage potentially dangerous situations in flight operations.

Element 4: Flight Crew Category System

The aircraft operator will have a Category system (or similar) that provides the framework for flight crew progression through the CBT program.

The aircraft operator's system for managing the advancement of flight crew through the CBT program will provide for assessment of achievement of required competencies with the prime focus on completion of published syllabus requirements to a satisfactory competency standard, not just on accruing flight hours.

Element 5: Assessment for Progression

The aircraft operator will have documented prescribed requirements for a candidate's training and phased progression through the CBT program.

The defined developmental pathway that an aircraft operator has in place for candidates of their CBT program should reflect clearly defined phases (as applicable):

- Entry phase;
- Initial training;
- Line/role training phase;
- Supervised consolidation training phase;
- Unrestricted operational phase; and
- Where applicable, Command upgrade phase (which should include initial command training including line training and consolidation prior to clearance and assignment to unrestricted operations).

At all phases of candidate progression, the defined requirements are to be based on assessment of competency against the nine identified Core Competencies.

Element 6: Use of Simulators

Ensuring high quality training of flight crew in a benign environment.

Where applicable and available for the aircraft type and/or operational role, flight simulation training devices (FSTDs) are to form an integral part of the CBT program. FSTDs range from part-task training devices, through non-specific, generic flight simulators to full-motion, full-visual, high-fidelity, type-specific flight simulators.

Approved and type-specific FAA/EASA Level D flight simulators should be routinely utilized wherever possible during progression through a CBT program.

Where simulators are used, the following minimum requirements shall be in place:

- Line Oriented Flight Training (LOFT) developed by and/or endorsed by the aircraft operator must form part of the syllabus;
- Crew Resource Management (CRM) or Airborne Decision Making (ADM) is to be assessed during all simulator training and checking sessions; and
- Localized experience and evidence-based scenarios are to be considered for development of LOFT exercises.

Element 7: Training and Checking Manual Inclusions

The aircraft operator's CBT program is to be fully documented.

Critical to the success of a competency-based training and assessment program, the aircraft operator must formally and comprehensively document the aims of the CBT program and the policies, processes and procedures that are to be followed to ensure required outcomes are achieved. The Training and Checking Manual (or specific CBT Manual) should also address the process for selection, training, and standardization of flight crew training and checking personnel.

Annex C: Fatigue Risk Management System (FRMS) Assessment

1. Regulatory Approval	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Has the responsible regulatory authority approved the FRMS?			
Date Approved?			
Valid until?			
Are there any conditions that have been imposed on this approval? If yes, outline.			
2. Management Commitment to Fatigue Risk Management Policy	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Does the Policy identify all operations to which the FRMS applies?			
Does the Policy state the safety objectives of the FRMS?			
Has the Policy been signed and approved by the accountable manager?			
Does the Policy declare management's commitment to effective reporting, adequate resourcing, and continuous improvement?			
3. Fatigue Safety Accountabilities	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Is there a Fatigue Safety Committee for the purpose of implementing, maintaining and periodic review of the FRMS and the related safety performance?			
4. Hazard Identification and Risk Assessment	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Is there a process for the reporting of fatigue hazards/incidents by all employees?			
Are there self-evaluation processes, such as reviews, surveys, internal audits, and assessments related to fatigue risk in the current operation?			
Is there a process that recognizes when to conduct formal fatigue hazard analysis and management of change, such as: • Introduction of new shift/roster systems; • Introduction of new long-range or greater operations; • Changes in crewing of high-risk tasks; and • Operations being performed in the Window of Circadian Low (WOCL) – 0200am – 0559am?			
Does the organisation use the hazard identification processes in determining all relevant maximum operational limits and minimum off-duty period and rest limits?			
Are there procedures to ensure that fatigue hazards are appropriately risk assessed (probability and severity determined in relation to the possible consequences)?			
Is there a set of criteria for evaluating fatigue-related risk and the level of risk the organisation is willing to accept?			
Is there a documented hazard identification and risk mitigation procedure involving the use of objective fatigue risk analysis tools?			
Is there a procedure to prioritize identified hazards for risk mitigation actions?			
Is there systematic and ongoing review of all aviation fatigue-related operations, processes, facilities, and equipment, relevant to the hazard identification and risk management processes?			
Are there documented corrective and preventative actions to respond to fatigue hazard/event analysis?			

5. Implementation of Operating Procedures	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Does the organisation have a validated process for ensuring that both planned and actual work hours provide sufficient sleep opportunity for flight crew (e.g., rostering software)?			
Are all planned work schedules and rosters analyzed for fatigue hazards prior to publishing?			
Does the organisation provide appropriate tools for flight crew to assess fatigue-related symptoms and behaviours in themselves and others?			
Are reporting procedures and required actions clearly defined for occasions when employees exhibit fatigue-related symptoms, or observe fatigue-related symptoms in a colleague?			

6. Fatigue Safety Assurance	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Is the setting of fatigue alerts or higher risk of fatigue criteria based on objective fatigue metric principles?			
Are the fatigue performance indicators being periodically reviewed?			

7. Fatigue Hazard/Event Reporting	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Are flight crew able to access, complete and submit a fatigue report in a simple and timely manner?			
Is there a process for formal review of reports with established risk thresholds for analysis, enquiry, investigation (if required)?			
Do the procedures ensure all reported occurrences and deficiencies are investigated and/or addressed?			
Are corrective/preventive actions generated from the event analysis and investigations?			

8. Continuous Improvement	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Is there a regular periodic internal audit of the FRMS?			
Does the internal FRMS audit/assessment contribute to the management review of FRMS review processes and timings?			
Does the management review of FRMS include the sampling of completed/existing fatigue hazard identification, risk assessments, remedial actions, and mitigations?			
Does the management review of FRMS processes include employee consultation and feedback?			

9. Training and Education	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Is there a program to provide FRMS training/familiarisation to personnel involved in the implementation of the FRMS?			
Does the organization's training include initial and recurrent training?			

10. Management of Change	Manual Reference	Present Y/N/P (partial)	Suitable Y/N
Are there procedures to identify changes in both the operational environment and within the AOC itself, where such changes may affect the FRMS?			
Are there procedures to amend or modify the FRMS given changes to the operational environment and the AOC?			
Does the organisation define significant and non-significant changes with respect to their maximum and minimum flight duty and off-duty periods?			

References:

FRMS implementation Guide for Operators 1st Edition 2011 (ICAO, IATA, IFALPA)
CASA FRMS Gap Analysis Tool, Version 1.0 November 2020

Annex 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

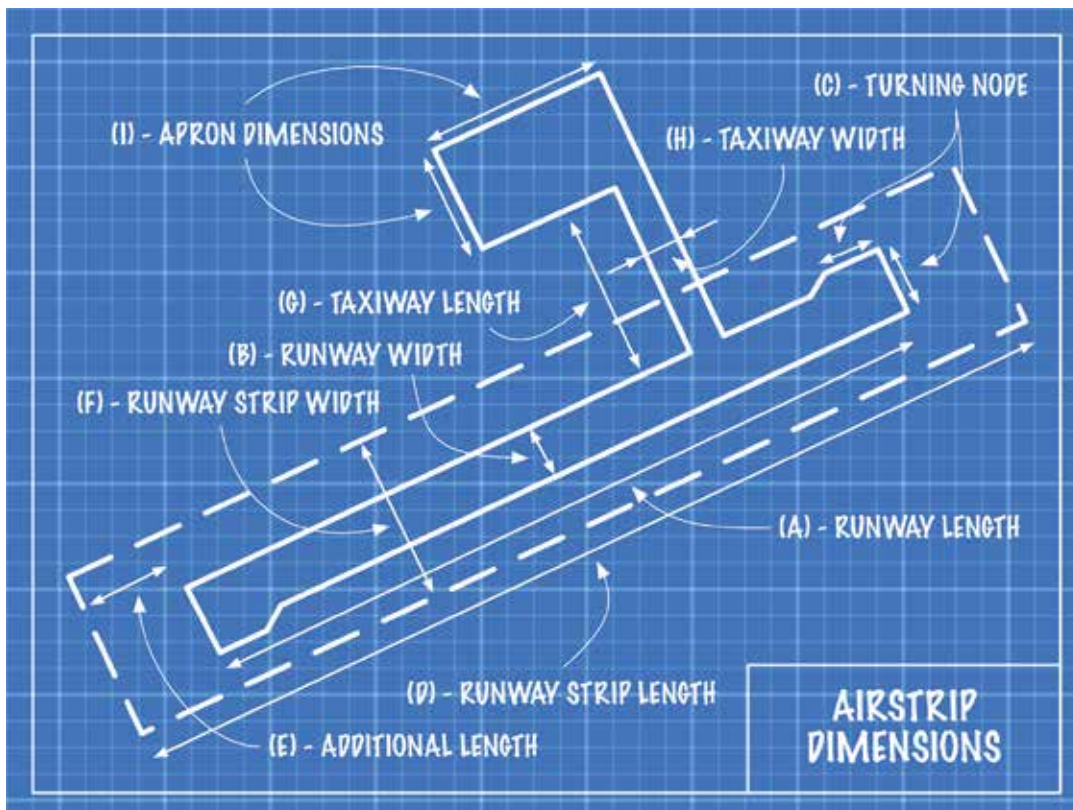


Figure 1: Geometric layout of short-term or emergency use airstrip.

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

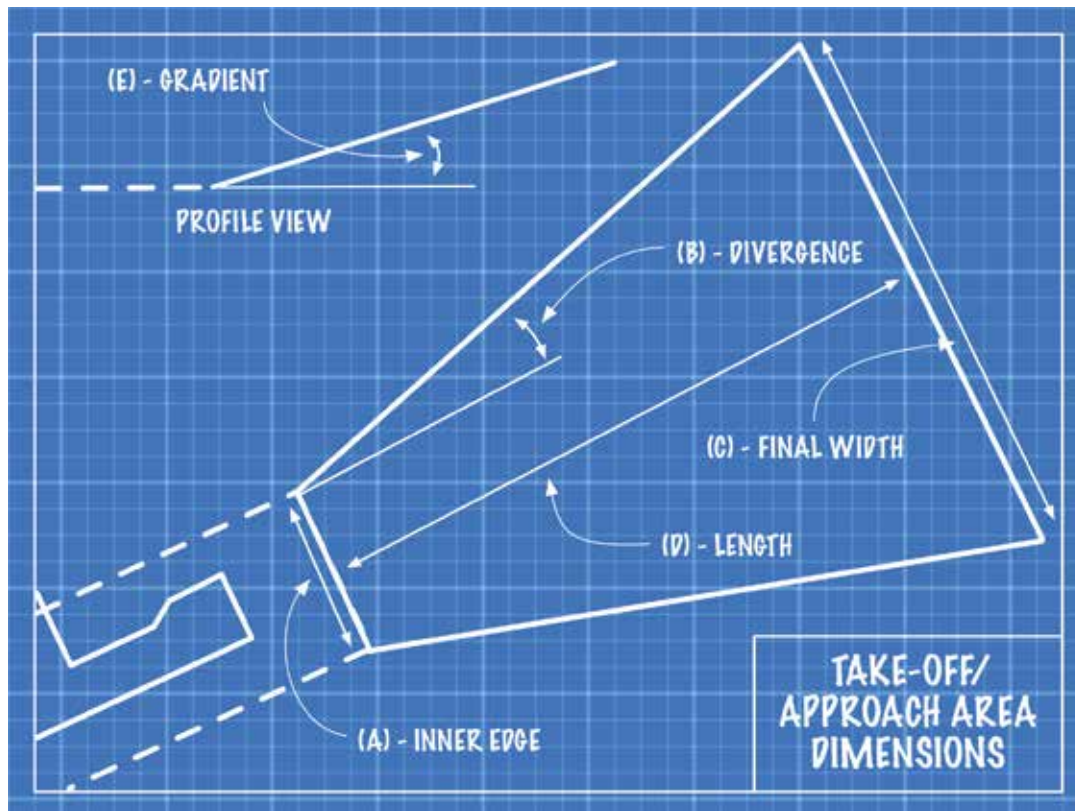


Figure 2: Takeoff/approach area (TOAA) schematic.

Transitional Area Dimensions

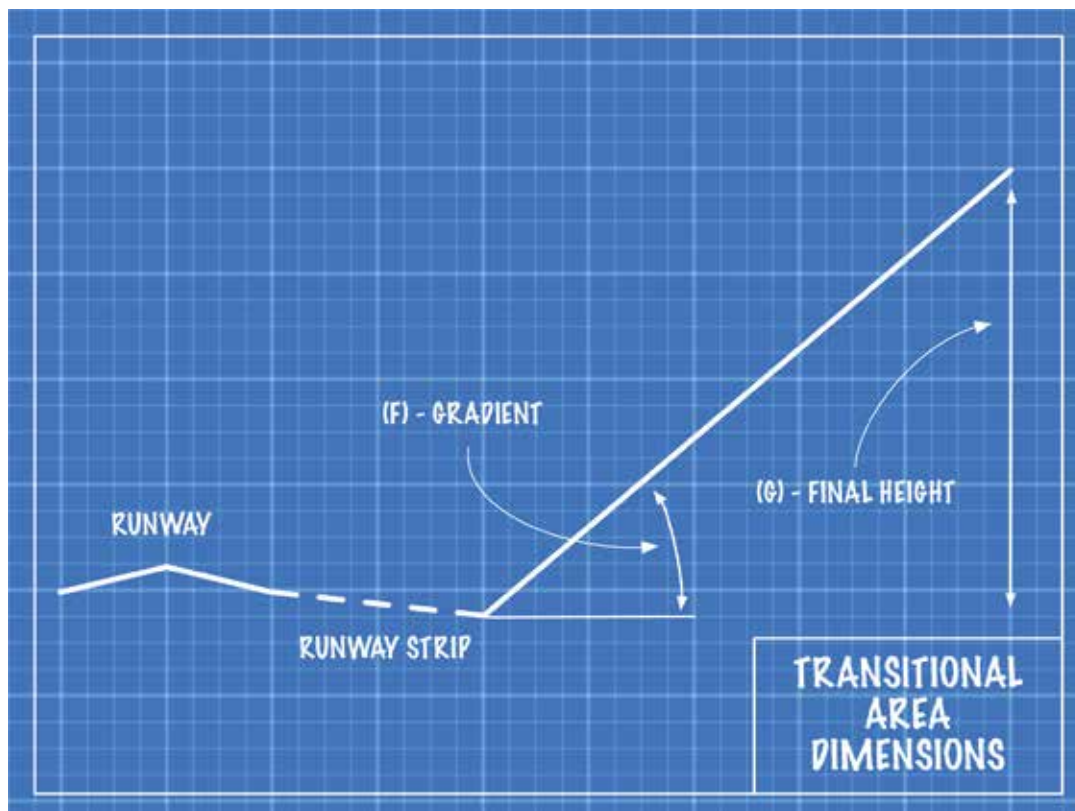


Figure 3: Transitional area schematic.

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	80 meters
Divergence (%)	B	10%
Length (m)	D	2,500 meters
Gradient (%)	E	4%
Transitional Areas		
Gradient (%)	F	20%
Final Height (m)	G	45 meters

Objects above 45 meters 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

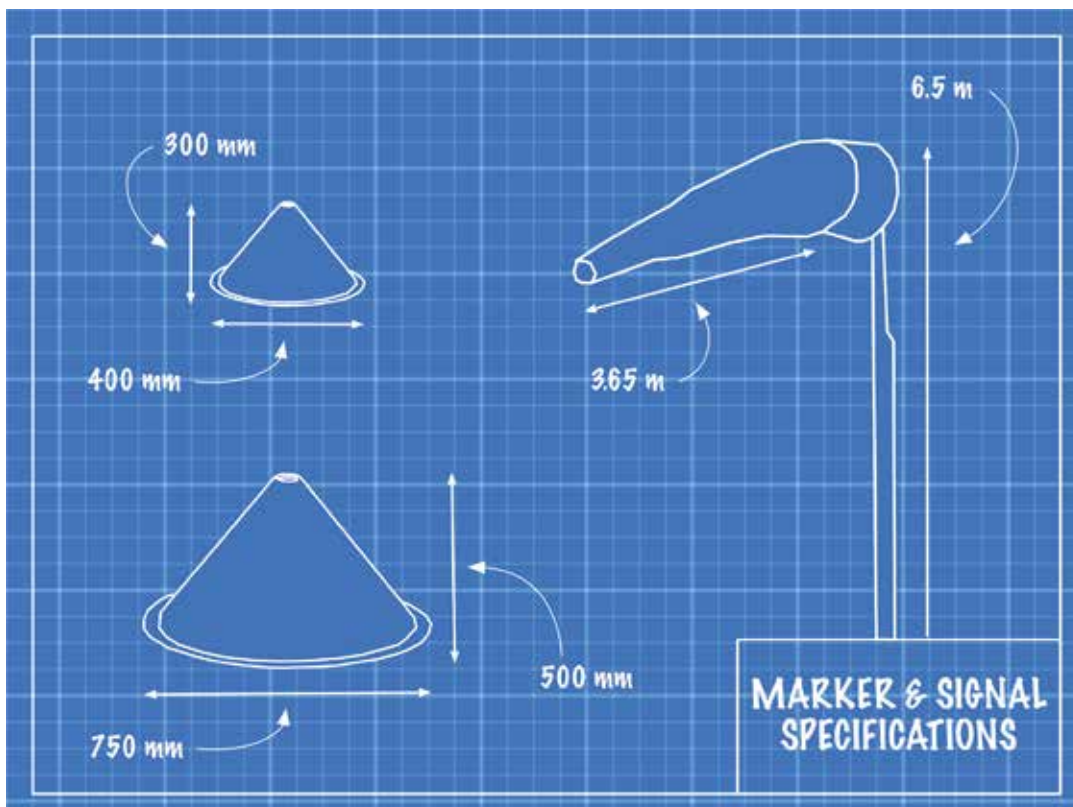


Figure 4: Marker and signal specifications.

Remote Airstrip Marker Layout

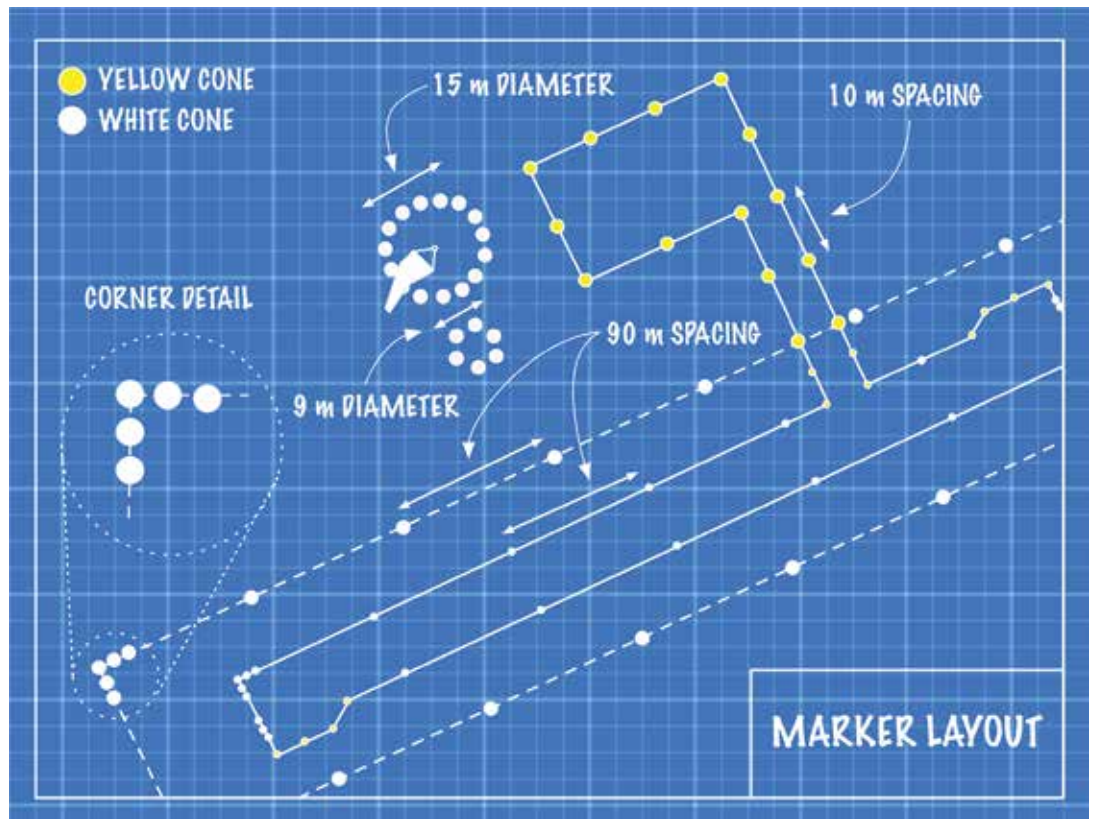


Figure 5: Marker Layout.

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 30 meters laterally and approximately 90 meters longitudinally, although they must be evenly spaced from runway end to end;
- **Taxiway and Apron Edge Lights:** these are blue lights spaced at 14 meters laterally and approximately 10 meters longitudinally;
- **Wind Indicator Lighting:** The windsock must be lit by appropriate floodlighting; and
- **Obstacle Lights:** All obstacles above 45 meters within 4,000 meters 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

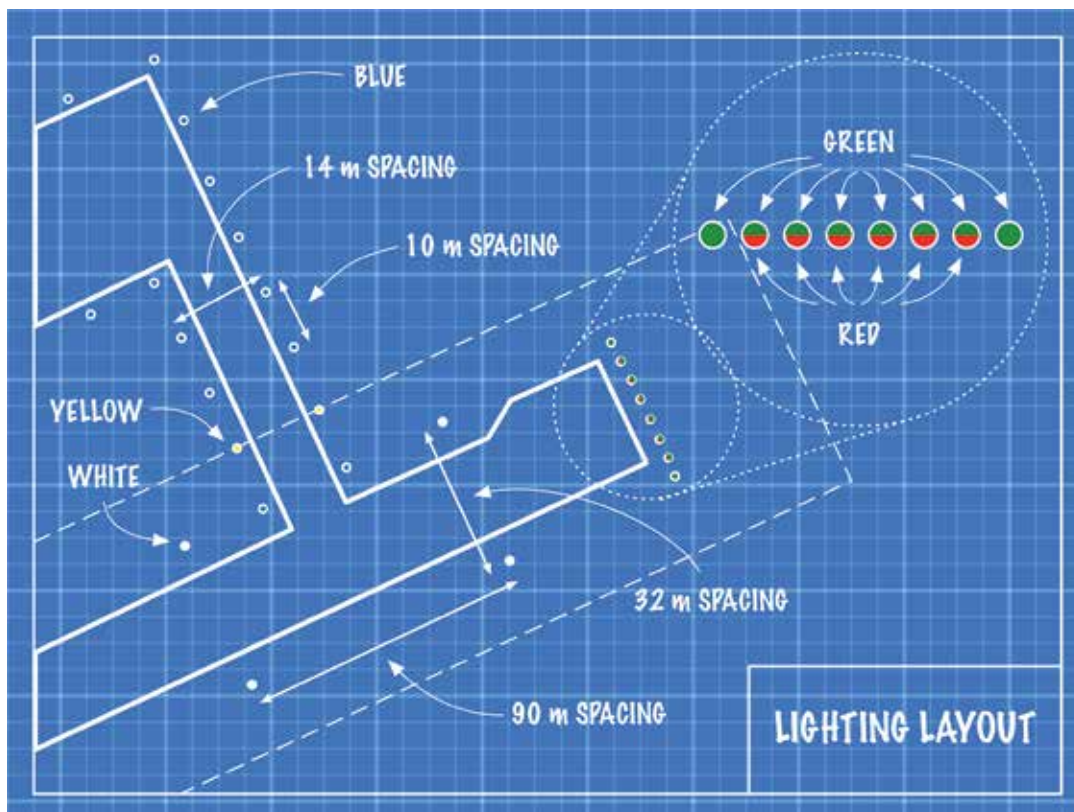


Figure 6: Lighting Layout.

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 preflight 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.

Preflight 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 19.13);
- Rescue Firefighting (BAR Standard 19.14);
- 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 preflight 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.

Annex 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:

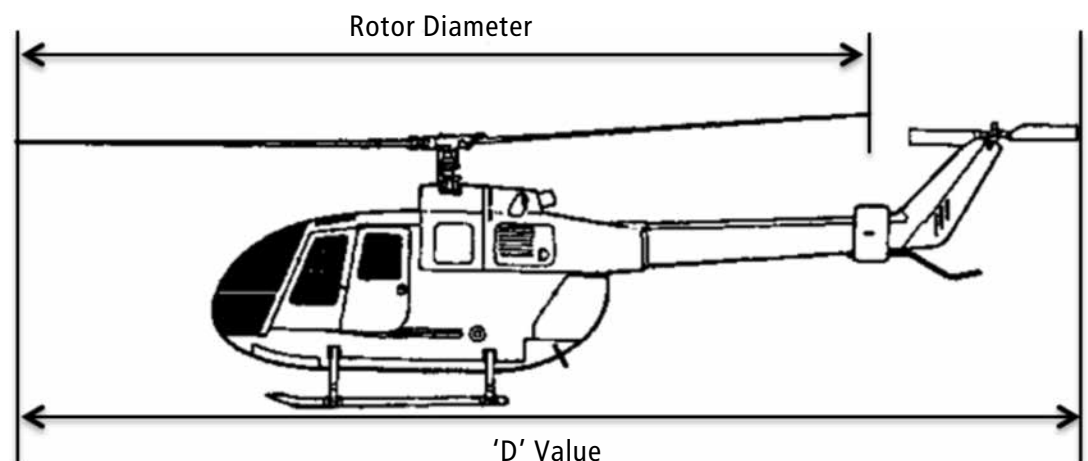
- **Performance Class 1.** Operations with performance such that, in the event of a critical engine failure, a helicopter is able to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the Takeoff Decision Point (TDP) or after passing the Landing Decision 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)

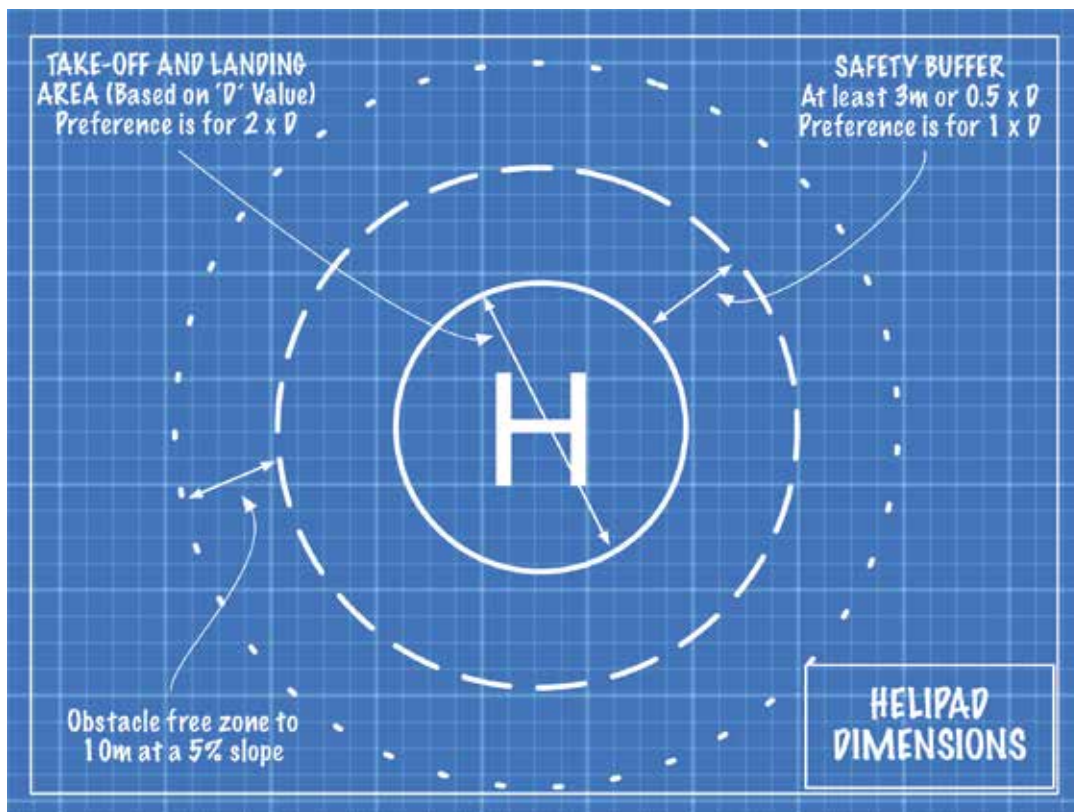


Figure 1: Helipad Safety Buffer

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 500 feet elevation above the helipad.

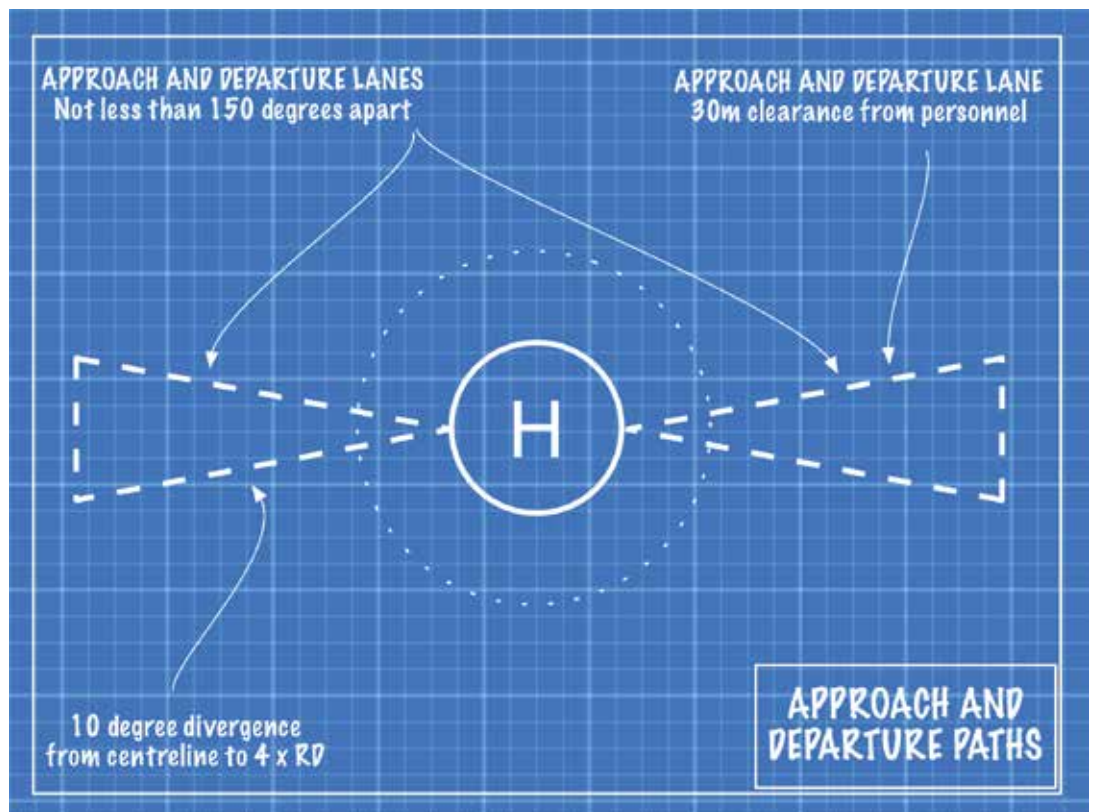


Figure 2: Vertical Approach and Departure Paths

The edges of the Approach and Departure segment should diverge at an angle of 10° to a width of $4 \times RD$ for the largest helicopter in use.

(FAA AC 150/5390-2C)

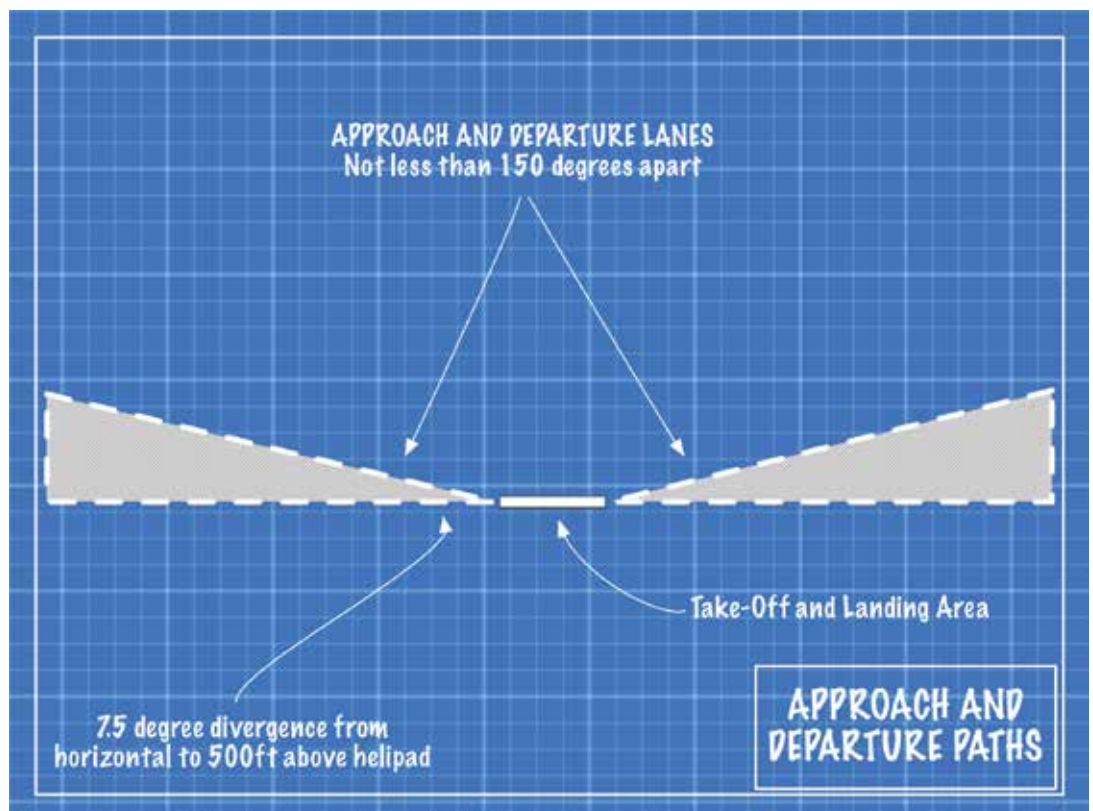


Figure 3: Horizontal Approach and Departure Paths

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)

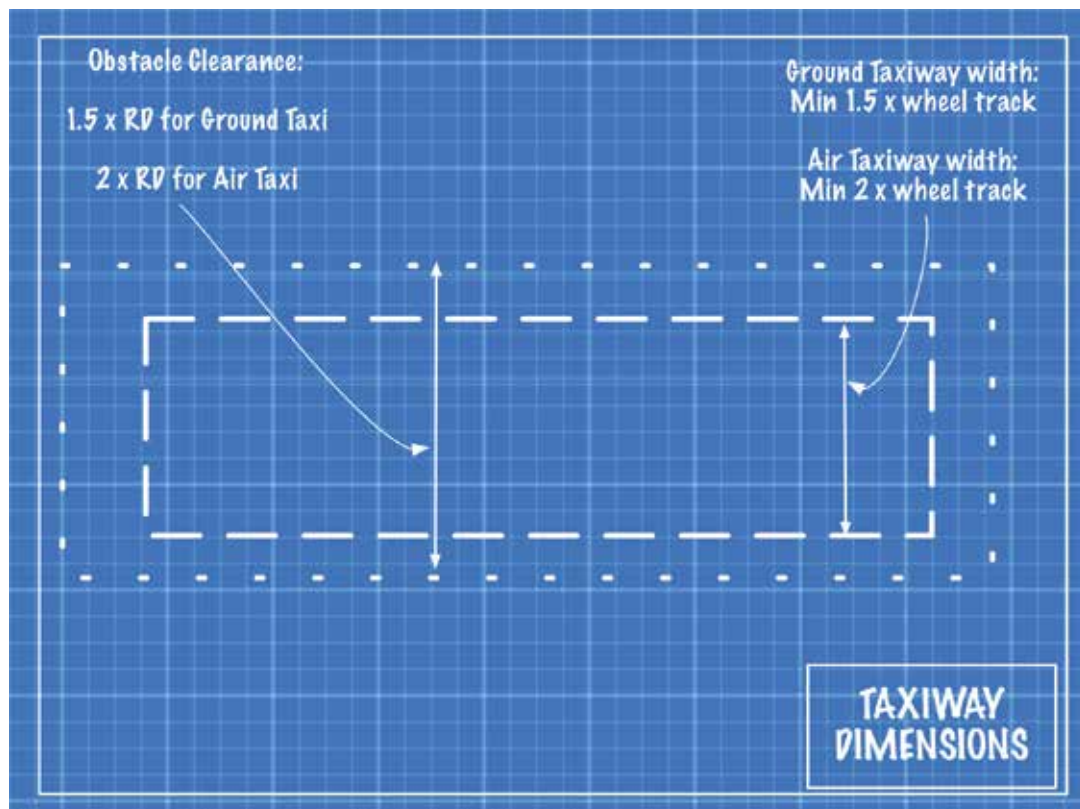


Figure 4: Helicopter taxiways

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.

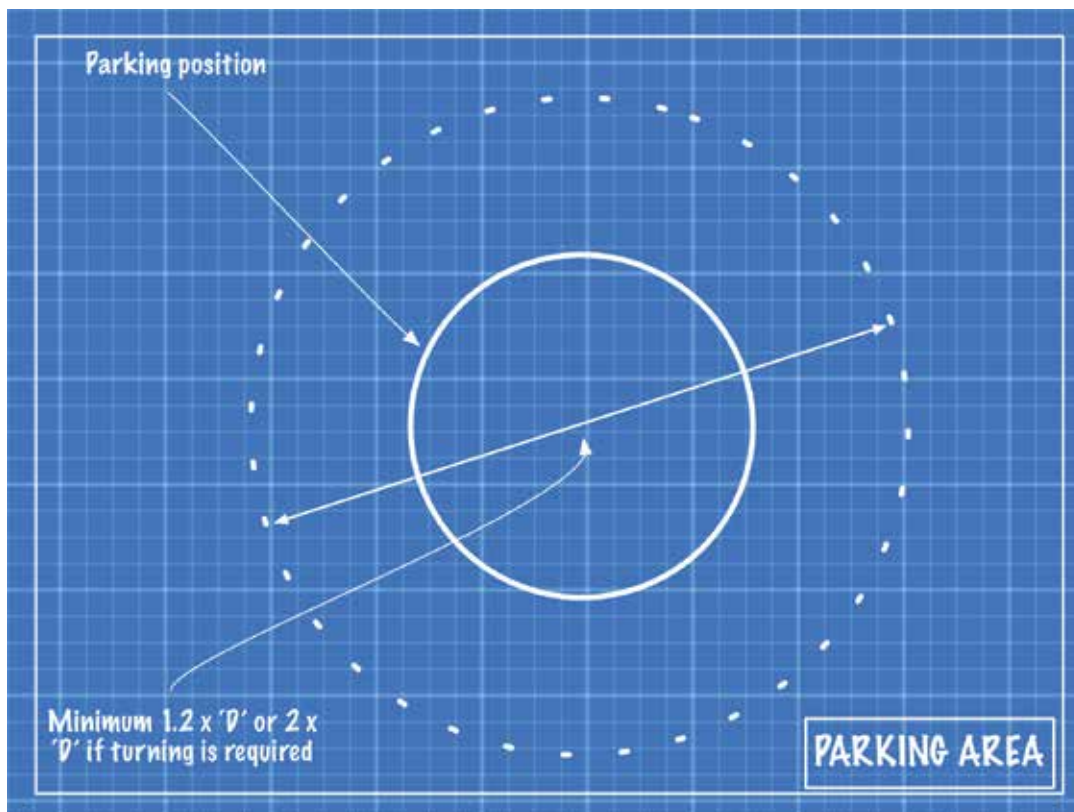


Figure 5: Helicopter Parking Area

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 15 meters in height.

(CAP 437)

E8: 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.

First Response to Aircraft Incident on Airfield

Rescue Firefighting capability should be subject to a risk assessment.
(See BARS Defence 19.14).

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 CO₂). 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 19.13 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.

Annex F: IAGSA Reconnaissance Flight Checklist

Checklist

Prior to the commencement of a survey operation, an aerial reconnaissance flight will be undertaken during Day VMC at a safe height and of sufficient duration to ensure wherever possible known and potential unknown hazards are identified. When necessary, an aerial reconnaissance flight will also be conducted when pilots are changed.

The risk assessment and reconnaissance flight data will be subject to formal review prior to the commencement of flight operations.

Once survey commences and as each subsequent line is flown, it is imperative to maintain an ongoing scan and awareness of obstacles and terrain in the direction of progress of the survey lines.

This constitutes an ongoing reconnaissance during the survey.

Newly identified obstacles, hazards or changes in terrain must be communicated.

When a pilot change occurs on a survey the new pilot can elect to perform a recon flight.

Checklist for Reconnaissance Flight				
Aircraft Identification		Date		Location
Pilot's name(s)				
Area(s) covered				

Highlighted issues captured from initial Aerial Survey Plan and Risk Assessment

Input from experienced flight crews, program managers, survey company and BARS Member Organization

COMMENTS FROM THE AERIAL RECONNAISSANCE FLIGHT

Check	Item	Comments
	Specific survey line(s) of concern	
	Specific survey area(s) of concern	
	Air traffic control procedures	
	Management of ground support operations	
	Airfield security	
	Volume of local traffic	
	Likely weather-related hazards for season and location	
	Any hazards associated with departure, transit and arrival locations	
	Percentage of area considered as Hostile Environment	
	Areas of Topographic concern High elevation	
	Areas of Topographic concern Steep Terrain	
	Area of heavily wooded or other terrain issues	
	Box canyons	
	Towers and other man-made structures	
	Private and recreational airstrips, unlicensed airfields	
	Prohibited, Restricted and Danger areas	
	Location of wildlife refuges or parks	
	Location of Indigenous reserves	
	Towers, Power lines, other man-made obstacles	
	Bird strike hazards, migratory routes/seasons, water habitats, local populations, densities	
	Mines/pits and Oil Rigs	
	Wind Farms	
	Other surveys/SIMOPS	
	Built-up areas	
	Farms(cattle, horses, etc.)	
	Wildlife activity	
	Hunting season? Area?	

Check	Item	Comments
	Contract Survey Height (state units)	
	Minimum Safe Survey Height (state units)	
	Other.	

Pilot Notes after Aerial Reconnaissance Flight:

Annex G: Simultaneous Operations (SimOps) Plan

Date	
Project Name	
Project Number	

1. Agenda

- List all project-specific daily pre-flight meeting agenda items in this section.
- A daily call/meeting between PICs of simultaneous operating aircraft is required to confirm timing and locations of day's planned activities.

Line group for each aircraft zone?	
Minimum survey visibilities required?	
Minimum separation between aircraft?	Min 20km FW and 5km RW
Required calibrations or testing?	
Other operators in vicinity?	
Any other agenda items?	

2. Communications

- Describe process for aircraft-to-aircraft communications.
- Ensure both company and non-company aircraft are included in considerations.

Identify all relevant frequencies including air-to-air chatter	
Increased 'blind' call frequency based on the line length	
Communications required prior to descending on-survey	
Communications required for any change of daily flight plan	
Broadcast prior to departing respective survey blocks	
Identify alternate routes back to base for inclement weather	
Broadcast any unexpected aircraft observed in the survey area.	

3. Separation

- Describe the method of aircraft separation once airborne from originating base.
- Ensure both company and non-company aircraft are included in considerations.

Ferry/corridor route and altitudes flown	
Time separation for departure	
Review identified 3rd party activities	

4. Dissemination of Information

- Indicate how the SimOps plan is communicated to all interested parties (including non-company).

SimOps plan reviewed with relevant external parties daily

SimOps plan reviewed with relevant external parties weekly

SimOps activity notification placed at airports within area

SimOps plan provided to field offices and all project aircraft

SimOps plan and contact list provided to all crew members

Maps identifying 3rd party activity to be developed

Review test range schedules such as IAGSA calendar

5. Confirmation of Briefing

Date	Name	Signature	Role

Maps and Diagrams (images may be combined as required)

- 1.1 Figure 1 – Survey Block/s (image 1) [insert survey overlay on Google image](#)
- 1.2 Figure 2 – Survey Block/s (image 2) [insert map with aircraft-specific survey areas and buffer 'no-fly' zones](#)
- 1.3 Figure 3 – Survey Block/s (image 3) [individual ferry corridor for each aircraft to/from survey block](#)
- 1.4 Figure 4 – Survey Block/s (image 4) [areas of activity – 3rd party operators map](#)
- 1.5 Figure 5 – Survey Block/s (image 5) [test/calibration areas](#)
- 1.6 Figure 6 – Survey Block/s (image 6) [other noteworthy items – fuel caches, restricted areas etc.](#)

Annex H: BARS Member Organization (BMO) – Relevant Controls

H1: Company Awareness

Common Control 1.14: 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.

Common Control 1.15: Operational Risk Assessment

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

H2: Airfield and Helipad Requirements

Control 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) Annex D provides additional guidance for short-term or emergency use airfields whilst Annex E provides additional guidance for helipad standards.

Control 2.2: Airfield Inspections

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

Control 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.

| Control 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.

| Control 8.2: 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.

| Control 8.3: 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.

| Control 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.

| Control 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.

| Control 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.

| Control 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 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.

| Defence 19.2: 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.

| Defence 19.13: 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.

| Defence 19.14: First Response to Aircraft Incident on Airfield

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.

Copyright, Copying and Updates

BARS Implementation Guidelines Version 10 Copyright 2024 by Flight Safety Foundation Limited (ABN 41 135 771 345) ("FSF Ltd") a wholly owned subsidiary of Flight Safety Foundation Inc. ("FSF Inc"), incorporated in the State of New York, USA.

A copy of the BARS Implementation Guidelines may be accessed on the BARS website: www.flightsafety.org/bars

The BARS Implementation Guidelines may be copied freely, in its entirety or in part, provided all such copies include this copyright notice and disclaimer in their entirety.

From time to time this BARS Implementation Guidelines may be updated. The website www.flightsafety.org should be consulted to obtain the latest updates.

Disclaimer

This BARS Implementation Guidelines is made generally available, with a view to raising awareness of safety and risk issues in respect of aviation and associated operations in the resource sector and other sectors which use air operators. Any person involved in these operations or sectors should not rely solely on this BARS Implementation Guidelines to manage risk, and must exercise their own skill, care and judgement with respect to the management of risk and the use of this guide.

FSF Ltd and FSF Inc expressly disclaim any and all liability and responsibility to any person in respect of the consequences of anything done or not done in reliance, whether wholly or in part on the guide. In no circumstances will either FSF Ltd or FSF Inc be liable for any incidental or consequential damages resulting from use of the guide.

Use, distribution or reproduction of this guide in any way constitutes acceptance of the above terms.

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
1920 Ballenger Ave., 4th Floor
Alexandria, Virginia US 22314

Telephone: +1 703 739 6700

Fax: +1 703 739 6708

