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Purpose

This Standard provides companies with minimum requirements for performing risk-based management of the aviation operations that support their activities. All national and international regulations pertaining to aviation operations must be followed. This Standard is designed to supplement those requirements.

Document Structure

The Standard is presented in a risk-based format to emphasize the relationship between threats to aviation operations, associated controls and applicable recovery/mitigation measures as presented in Figure 1.

The format is intended to assist all company personnel engaged in coordinating aviation activities to manage and understand the aviation risk to their operation.

All companies and aircraft operators are encouraged to further risk assess all controls to the level of detail they consider necessary for their individual operations.

Aircraft Operator Review

This Standard is designed to be used as a primary reference for the review and approval of aircraft operators supporting companies in the resource sector. Aircraft operators will be audited to the BARS Question Master List with questions drawn from this Standard and the ICAO Annexes.

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.

A diagram showing the Basic Aviation Risk Standard Variance Process is presented in Figure 2 on page 8.

Key Definitions

Company

Refers to the individual entity using this Standard to support their aviation operations.

Operator

Refers to an aircraft operating company used to provide aviation services.

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.

Non-hostile environment

An environment in which a successful emergency landing can be reasonably assured and the occupants of the aircraft can be adequately protected from the elements. Search and rescue response/capability can be provided consistent with the anticipated exposure.

Long-term contract

Any contract using dedicated aircraft for a planned duration of greater than six months.

Competent Aviation Specialist

A company designated aviation advisor or Flight Safety Foundation BARS Accredited Auditor.

Additional definitions related to the use of this Standard are listed in Appendix 3.
Figure 1: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and Recovery Measures.

### Threats

| Threat 2.0: Runway Excursions |
| Threat 3.0: Fuel Exhaustion |
| Threat 4.0: Fuel Contamination |
| Threat 5.0: Controlled Flight Into Terrain (CFIT) |
| Threat 6.0: Incorrect Loading |
| Threat 7.0: Collision On Ground |
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### Common Controls: All Threats 1.0

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

### Controls

| Airfield Design and Helipad Design |
| Airfield Inspections |
| Landing Site Assessments |
| Balanced Field Length |
| Destination Weather Reporting |
| Slope Guidance |
| Wind Shear Training |
| VFR Minimum Requirements |
| Cold Weather Training |

- **Fuel Check**
- **Weather Data**
- **Flight Plan**
- **IFR Fuel Plan**
- **VFR Fuel Plan**
- **Hot Refueling**

- **Fuel Testing**
- **Fuel Filtration**
- **Fuel Sampling**
- **Fuel Shortage**

| Night/IFR – Two Crew |
| Night/IFR – Aircraft |
| Night/IFR – Flight Planning |
| Night/IFR – Simulator Training |
| Night/IFR – Approach/Landing |
| Night/IFR – Autopilot |
| Special VFR Procedures |
| Stabilized Approaches |

- **Passenger Weight**
- **Cargo Weight and Loading**
- **Load and Trim Calculations**
- **Manifest**
- **Dangerous Goods Cargo**

- **Total Aircraft Weight and Balance**
- **Medical Transfers**
- **Communications**
- **Risk Assessment**

- **Cruising Altitudes**
- **Radar Controlled Airspace**
- **Airfield Bird Control**
- **Helicopter Vibration Monitoring**
- **Engine Trend Monitoring**

- **Adverse Weather Policy**
- **Thunderstorm Avoidance**
- **Weather Radar**
- **Equipment Documentation**
- **Equipment Inspection Schedule**
- **Provision of Oxygen**
- **Flight Crew Qualifications, Experience and Recency**
Recovery Measures.

Figure 1: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and Recovery Measures.

Aircraft Accident

Recovery Measures:

- Aircraft Certification Standards
- Emergency Response Plan
- Emergency Locator Transmitter
- Satellite Flight Following
- Flight Following
- Survival Kit
- Flight Crew PLB
- First-Aid Kit
- Passenger Dress Requirements
- Cockpit Voice Recorder (CVR)/Flight Data Recorder (FDR)
- Upper Torso Restraint
- Limitations in Sideways Seating
- Crash Boxes
- Rescue Firefighting
- Insurance
Common Control 1.1: Approved Aircraft Operator
Use only licensed aircraft operators who have been approved for use by company established process and where necessary, a Competent Aviation Specialist.

Common Control 1.2: Flight Crew Qualifications, Experience and Recency
Flight crew must meet the requirements listed in Appendix 1.

Common Control 1.3: Flight Crew Check and Training
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.

Common Control 1.4: Maintenance Personnel Qualification
Maintenance personnel must meet the experience requirements listed in Appendix 1.

Common Control 1.5: Maintenance Training
The aircraft operator or approved maintenance organization must develop a program for the training of maintenance personnel at least every three years. The training must include human factors in maintenance and company maintenance documentation and procedures and where appropriate include technical components for aircraft and systems being maintained.

Common Control 1.6: Basic Aircraft Equipment Fit
Aircraft basic equipment fit must meet the requirements listed in Appendix 2.

Common Control 1.7: Drug and Alcohol Policy
The aircraft operator must have a Drug and Alcohol Policy which meets all requirements of the responsible regulatory authority. Where no such regulatory requirements exist the operator must at a minimum meet the requirements of the contracting company.

Common Control 1.8: Flight Time Limits
Apply the following flight time limits unless the responsible regulatory authority’s requirements are more stringent:

<table>
<thead>
<tr>
<th>Single-pilot operation</th>
<th>Two-pilot operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 hours daily flight time</td>
<td>10 hours daily flight time</td>
</tr>
<tr>
<td>40 hours in any 7 day consecutive period</td>
<td>45 hours in any 7 day consecutive period</td>
</tr>
<tr>
<td>100 hours in any 28 day consecutive period</td>
<td>120 hours in any 28 day consecutive period</td>
</tr>
<tr>
<td>1000 hours in any 365 day consecutive period</td>
<td>1200 hours in any 365 day consecutive period</td>
</tr>
</tbody>
</table>
Common Control 1.9: Flight Crew Duty Time

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.

Common Control 1.10: Maintenance Duty Time

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.

Common Control 1.11: Aircraft Operator Safety Management System

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

Refer to the following information on SMS development:

ICAO Safety Management System

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

International Helicopter Safety Team – SMS Toolkit

Common Control 1.12: 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 1.13: Operational Risk Assessment

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

Common Control 1.14: Sub-chartering Aircraft

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.
Figure 2: BARS Process.
Threat 2.0: Runway Excursions
An aircraft departs the runway during takeoff or on landing and this results in an accident

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) Section 4 provides additional guidance for short-term or emergency use airfields whilst Section 5 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 2.3: Landing Site Assessments
Aircraft operators must conduct landing site assessments prior to commencing operations. Incorporate the results into the operational risk assessment (Control 1.13).

Control 2.4: Balanced Field Length
All multi-engine aeroplanes must meet balanced field requirements where following an engine failure on takeoff, the aircraft can stop on the remaining runway and stop-way, or, using the remaining runway and clearway, climb and achieve a net climb gradient greater than the takeoff path obstacle gradient.

Control 2.5: Balanced Field Length – No Performance Charts
Multi-engine aeroplanes that do not have the appropriate Flight Manual performance charts to achieve Control 2.4 must restrict their payload so that in the event of an engine failure, the net takeoff path clears obstacles by 35 feet up to a height of 1500 feet above the aerodrome, using the following conditions.

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

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 2.7: Slope Guidance
Install visual slope guidance on company owned and operated airfields.
**Threat 3.0: Fuel Exhaustion**
An aircraft conducts a forced landing or ditching as a result of fuel exhaustion and this results in an accident

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**Control 3.1: Fuel Check**
The aircraft operator must have procedures in place that require the Pilot-in-Command to ensure the required amount of fuel is on board the aircraft prior to each flight.

**Control 3.2: Flight Plan Weather Data**
Provide the flight crew with access to reliable weather information when determining fuel loads in pre-flight planning.

**Control 3.3: Flight Plan**
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.

**Control 3.4: Instrument Flight Rules (IFR) Fuel Plan**
In addition to operational holding fuel requirements, fuel loads must cover fuel used during start-up, taxi, en route, approach and transit to the alternate destination (if required). Carry additional variable reserves of 10% of the total trip fuel and 30 minutes as fixed reserve.

**Control 3.5: Visual Flight Rules (VFR) Fuel Plan**
Fuel loads must cover the planned route. Carry an additional variable reserve of 10% of the total trip fuel and 30 minutes as fixed reserve.

**Control 3.6: Hot Refueling**
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 onboard 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 occupied (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;
- Anti-collision lights, radio altimeter, radar, transponder and DME equipment must be switched OFF;
- 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 in normal circumstances and only if the APU is inoperative. An APU running without engines operating does not constitute hot refueling and is acceptable.

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. Personnel manning firefighting equipment must be present during the activity.
**Threat 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.

**Control 4.1: Fuel Testing**

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

**Control 4.2: Fuel Filtration**

Equip fuel delivery systems including portable systems with water blocking filtration of the Go/No-Go types. Mark filter canisters with the next date of change or inspection cycle. Replace all filters at 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.

**Control 4.3: Fuel Sampling**

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

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

**Control 4.4: Fuel Storage**

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 metre) 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.

**Control 4.5: Drummed Fuel**

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

**Storage:**

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

**Quality:**

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

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

*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.
**Threat 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

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

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

**Control 5.2: Special VFR Procedures**

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

**Control 5.3: Night or IFR – Aircraft**

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

**Control 5.4: Night or IFR – Flight Planning**

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

**Control 5.5: Night or IFR – Simulator Training**

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.

**Control 5.6: Night or IFR – Approach/Landing Recency**

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.

**Control 5.7: Night or IFR – Autopilot**

An autopilot or AFCS must be fitted for night or IFR flights. The aircraft operator must have an automation policy in the relevant Operations Manual that outlines the conditions and procedures for manual flying.

**Control 5.8: Stabilized Approaches**

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

**Control 5.9: Mandatory Go-around Procedures**

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

**Control 5.10: Flight Data Monitoring**

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

**Control 5.11: 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.

**Control 5.12: CRM/ADM Training**

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

**Control 5.13: Terrain Awareness Warning Systems (TAWS)**

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.
Threat 6.0: Incorrect Loading
Incorrect loading of passengers and/or their lack of proper safety awareness results in an aircraft accident

Control 6.1: Passenger Weight
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.

Control 6.2: Cargo Weight and Loading
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.

Control 6.3: Load and Trim Calculations
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.

Control 6.4: Manifest
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.

Control 6.5: Dangerous Goods Cargo (Hazardous Materials)
Comply with current International Air Transport Association (IATA) requirements (or similar requirements such as Title 49 of the Code of Federal Regulations) associated with Dangerous Goods Regulations. The aircraft operator must have appropriate procedures and trained personnel for the carriage and acceptance of dangerous goods. All crew must complete dangerous goods awareness training at least every two years.

Control 6.6: Passenger Briefing
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.

Control 6.7: Multi-language Briefing
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.
Threat 7.0: Collision on Ground
An aircraft and an object collide on the ground resulting in an accident

Control 7.1: 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 7.2: 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 7.3: 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 7.4: Ground Procedures
The Operations Manual must include requirements on ground handling and the maneuvering of aircraft.

Control 7.5: Rotors Running Load/Unload
When loading or unloading passengers from helicopters with rotors running, the pilot at the controls must only perform cockpit duties that are related to the identification of external hazards and passenger movement around the aircraft. The transfer of passengers whilst the rotors are running must be supervised by a designated PCO or HLO.

Control 7.6: 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 7.7: Perimeter Fence
Construct a perimeter fence around all company owned and operated airfields to prevent access by livestock, other animals and traveling pedestrians.

Control 7.8: 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.
Threat 8.0: Collision in Air
An aircraft and object collide in air resulting in an accident

Control 8.1: Cruising Altitudes
Comply with the ICAO cruising altitudes for both VFR and IFR flight unless circumstances, such as weather, require non-standard procedures. Where known bird migratory routes are identified, make practical attempts to plan cruise altitudes above 3000 feet above ground level.

Control 8.2: Radar Controlled Airspace
The Pilot-in-Command must consider the use of Air Traffic Controlled or Monitored airspace when determining cruising altitudes utilized during flight.

Control 8.3: Airfield Bird Control
Conduct active bird control at all company owned and operated airfields when required and record the presence of birds periodically. Where possible, birds must be dispersed or removed in accordance with local wildlife regulations. Seeding grass, open waste disposal and water ponds must be restricted to remove attractions for birds.

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

Control 8.4: Traffic Collision Avoidance System (TCAS)
Aircraft capable of being flown at night, under the IFR and on long-term contract must be fitted with a TCAS. The aircraft operator must have a procedure describing the action to be taken for TCAS alerts.

Control 8.5: High Intensity Strobe Lights
Aircraft on long-term contract operating in airspace without radar coverage and where the potential for conflicting traffic is assessed as being high, must have high intensity strobe or pulse lights fitted.
Threat 9.0: Structural or Mechanical Failure

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

Control 9.1: Single-engine Aircraft

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

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

Control 9.2: Multi-engine Aircraft

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) night conditions; and/or
- Operating on extended over water flights.

Control 9.3: Supply of Spares

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

Control 9.4: Hangar Facilities

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.

Control 9.5: Helicopter Vibration Monitoring

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.

Control 9.6: Engine Trend Monitoring

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.

Control 9.7: Minimum Equipment List (MEL)

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.

Control 9.8: Aural Cabin Pressure Warning System

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.
Control 10.1: Adverse Weather Policy

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

Control 10.2: Thunderstorm Avoidance

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

Control 10.3: Weather Radar

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.

Control 10.4: Wind Shear Training

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.

Control 10.5: VFR Minimum Requirements

Aircraft operating under VFR must be flown in accordance with the minimum local regulatory requirements for flight under the VFR for departure, enroute 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.

Control 10.6: Cold Weather Training

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/).
### Threat 11.0: Medical Evacuation

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

<table>
<thead>
<tr>
<th>Threat</th>
<th>Controls</th>
</tr>
</thead>
</table>
| Threat 11.0: Medical Evacuation | Securing Equipment  
Weight and Balance  
Medical Transfers  
Communications  
Risk Assessment |
| | Equipment Documentation  
Equipment Inspection Schedule  
Provision of Oxygen  
Flight Crew Qualifications, Experience and Recency |

**Control 11.1: Securing of Medical Equipment**

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

**Control 11.2: Weight and Balance**

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

**Control 11.3: Medical Transfers**

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

**Control 11.4: Communications**

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

**Control 11.5: Risk Assessment**

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

**Control 11.6: Equipment Documentation**

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

**Control 11.7: Equipment Inspection Schedule**

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

**Control 11.8: Provision of Oxygen**

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.

**Control 11.9: Flight Crew Qualifications, Experience and Recency**

Comply with the requirements listed in Appendix 1.
Defences 12.0: Aircraft Accident

Mitigating defences in the event of an aircraft accident

Defence 12.1: Aircraft Certification Standards

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

Defence 12.2: 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 12.3: Emergency Locator Transmitter

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.

Defence 12.4: Satellite Flight Following

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.

Defence 12.5: Flight Following

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

Defence 12.6: Survival Kit

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.

Defence 12.7: Flight Crew PLB

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

Defence 12.8: First-Aid Kit

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

Defence 12.9: Passenger Dress Requirements

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

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

Defence 12.10: Cockpit Voice Recorder (CVR)/Flight Data Recorder (FDR)

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.
Defence 12.11: Upper Torso Restraint

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

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

Defence 12.12: Limitations in Sideways Seating

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

Defence 12.13: 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 12.14: Rescue Firefighting

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

Defence 12.15: Insurance

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.
Appendices
# Pilot-in-Command – Aeroplanes and Helicopters

<table>
<thead>
<tr>
<th>Qualifications</th>
<th>&gt;5700 kg Multi-engine</th>
<th>&lt;5700 kg Multi-engine</th>
<th>Single-engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence</td>
<td>ATPL</td>
<td>CPL</td>
<td>CPL</td>
</tr>
<tr>
<td>Instrument Rating (1)</td>
<td>Command, multi-engine</td>
<td>Command, multi-engine</td>
<td>Not required</td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>3000</td>
<td>2500</td>
<td>2000</td>
</tr>
<tr>
<td>Total Command</td>
<td>2500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>Total Command Multi-engine</td>
<td>500</td>
<td>500</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Command on Type (3)</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Experience in Topographical Area</td>
<td>One year experience in area similar to specified in contract (arctic, offshore, high density altitude mountainous, jungle, international operations, etc).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(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 in lieu of 100-hours.

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

---

# Co-pilot – Aeroplanes and Helicopters

<table>
<thead>
<tr>
<th>Qualifications</th>
<th>&gt;5700 kg Multi-engine</th>
<th>&lt;5700 kg Multi-engine</th>
<th>Single-engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence</td>
<td>CPL</td>
<td>CPL</td>
<td>CPL</td>
</tr>
<tr>
<td>Instrument Rating</td>
<td>Command</td>
<td>Co-pilot</td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>500</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Total Multi-engine</td>
<td>100</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Total on Type (2)</td>
<td>50</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

(2) Both Pilot-in-Command and Co-pilot – Aeroplanes and Helicopters

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

---

# Maintenance Personnel – Aeroplanes and Helicopters

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

(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 in lieu of 100-hours.

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

## Helicopters and Aeroplanes

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Multi-engine</th>
<th>Single-engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two VHF Transceivers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One HF Transceiver, if VHF coverage is not available for the entire area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode C or S Transponder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSO 126 ELT</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>GPS (IFR TSO required for night or IFR operations)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Torso Restraints (Helicopter and SE Aeroplane only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First-Aid Kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Fire Extinguisher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival Equipment, tailored to environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic Electronic Engine Trend Monitoring – required for single-engine aircraft on long-term contract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal PA system or effective ability to communicate with passengers</td>
<td>Required for passenger carrying operations</td>
<td></td>
</tr>
<tr>
<td>Passenger Briefing Cards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autopilot or AFCS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two ADF, if NDB approach is only approved instrument approach available</td>
<td>Required IFR or Night</td>
<td></td>
</tr>
<tr>
<td>Two VOR/ILS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VSI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio Altimeter with audio and visual alert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color Weather Radar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAWS</td>
<td></td>
<td>Optional</td>
</tr>
<tr>
<td>Satellite Flight Following (hostile environment)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVR/FDR, or as required by local CAA (&gt;9 passenger seats)</td>
<td>Required for dedicated long-term contracts</td>
<td></td>
</tr>
<tr>
<td>HUMS, UMS or VMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDM – contracts exceeding three years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance based navigation system where ground based navigation systems do not provide approach capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Visibility Pulse Lights – in areas of traffic</td>
<td></td>
<td>Optional</td>
</tr>
<tr>
<td>External Mirrors for situational awareness (helicopters only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Loud Hailer for passenger control (helicopters only)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(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.
### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAS</td>
<td>Airborne Collision Avoidance System</td>
</tr>
<tr>
<td>ADF</td>
<td>Automatic Direction Finder</td>
</tr>
<tr>
<td>ADM</td>
<td>Aeronautical Decision Making</td>
</tr>
<tr>
<td>AFCS</td>
<td>Automatic Flight Control System</td>
</tr>
<tr>
<td>AGL</td>
<td>Above Ground Level</td>
</tr>
<tr>
<td>ALAR</td>
<td>Approach and Landing Accident Reduction</td>
</tr>
<tr>
<td>AMSL</td>
<td>Above Mean Sea Level</td>
</tr>
<tr>
<td>AOC</td>
<td>Air Operator’s Certificate</td>
</tr>
<tr>
<td>AP</td>
<td>Autopilot</td>
</tr>
<tr>
<td>APU</td>
<td>Auxiliary Power Unit</td>
</tr>
<tr>
<td>ATPL</td>
<td>Air Transport Pilot Licence</td>
</tr>
<tr>
<td>AWOS</td>
<td>Automated Weather Observation System</td>
</tr>
<tr>
<td>BARS</td>
<td>Basic Aviation Risk Standard</td>
</tr>
<tr>
<td>BIG</td>
<td>BARS Implementation Guidelines</td>
</tr>
<tr>
<td>CAA</td>
<td>Civil Aviation Authority</td>
</tr>
<tr>
<td>C of G</td>
<td>(Aircraft) Center of Gravity</td>
</tr>
<tr>
<td>CFIT/W</td>
<td>Controlled Flight into Terrain/Water</td>
</tr>
<tr>
<td>CPL</td>
<td>Commercial Pilot’s Licence</td>
</tr>
<tr>
<td>CRM</td>
<td>Crew Resource Management</td>
</tr>
<tr>
<td>CVR</td>
<td>Cockpit Voice Recorder</td>
</tr>
<tr>
<td>DG</td>
<td>Dangerous Goods</td>
</tr>
<tr>
<td>DME</td>
<td>Distance Measuring Equipment</td>
</tr>
<tr>
<td>DSV</td>
<td>Drilling Support Vessels</td>
</tr>
<tr>
<td>ELT</td>
<td>Emergency Locator Transmitter</td>
</tr>
<tr>
<td>EPIRB</td>
<td>Emergency Position Indicating Radio Beacon</td>
</tr>
<tr>
<td>ERP</td>
<td>Emergency Response Plan</td>
</tr>
<tr>
<td>FAA</td>
<td>Federal Aviation Authority (USA)</td>
</tr>
<tr>
<td>FDM</td>
<td>Flight Data Monitoring</td>
</tr>
<tr>
<td>FDR</td>
<td>Flight Data Recorder</td>
</tr>
<tr>
<td>FPSO</td>
<td>Floating Production and Storage Offload</td>
</tr>
<tr>
<td>GA</td>
<td>General Aviation</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>HF</td>
<td>High Frequency</td>
</tr>
<tr>
<td>HLO</td>
<td>Helideck Landing Officer</td>
</tr>
<tr>
<td>HUET</td>
<td>Helicopter Underwater Escape Training</td>
</tr>
<tr>
<td>HMS</td>
<td>Health and Usage Monitoring System</td>
</tr>
<tr>
<td>IAGSA</td>
<td>International Airborne Geophysics Safety Association</td>
</tr>
<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
</tr>
<tr>
<td>IFR</td>
<td>Instrument Flight Rules</td>
</tr>
<tr>
<td>ILS</td>
<td>Instrument Landing System</td>
</tr>
<tr>
<td>IMC</td>
<td>Instrument Meteorological Conditions</td>
</tr>
<tr>
<td>LSALT</td>
<td>Lowest Safe Altitude</td>
</tr>
<tr>
<td>MAP</td>
<td>Missed Approach Point</td>
</tr>
<tr>
<td>MEL</td>
<td>Minimum Equipment List</td>
</tr>
<tr>
<td>MODU</td>
<td>Mobile Drilling Unit</td>
</tr>
<tr>
<td>NDB</td>
<td>Non-Directional Beacon</td>
</tr>
<tr>
<td>NVIS</td>
<td>Night Vision Imaging System</td>
</tr>
<tr>
<td>NVFR</td>
<td>Night Visual Flight Rules</td>
</tr>
<tr>
<td>OEI</td>
<td>One Engine Inoperative</td>
</tr>
<tr>
<td>PCN</td>
<td>Pavement Classification Number</td>
</tr>
<tr>
<td>PCO</td>
<td>Passenger Control Officer</td>
</tr>
<tr>
<td>PIC</td>
<td>Pilot-in-Command</td>
</tr>
<tr>
<td>PLB</td>
<td>Personal Locator Beacon</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SAR</td>
<td>Search and Rescue</td>
</tr>
<tr>
<td>SMS</td>
<td>Safety Management System</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard Operating Procedure</td>
</tr>
<tr>
<td>STC</td>
<td>Supplementary Type Certificate</td>
</tr>
<tr>
<td>SVFR</td>
<td>Special Visual Flight Rules</td>
</tr>
<tr>
<td>TAWS</td>
<td>Terrain Awareness Warning System</td>
</tr>
<tr>
<td>TCAS</td>
<td>Traffic Collision Avoidance System</td>
</tr>
<tr>
<td>TEM</td>
<td>Threat and Error Management</td>
</tr>
<tr>
<td>TSO</td>
<td>Technical Standards Order</td>
</tr>
<tr>
<td>UMS</td>
<td>Unit Monitoring System</td>
</tr>
<tr>
<td>VFR</td>
<td>Visual Flight Rules</td>
</tr>
<tr>
<td>VHF</td>
<td>Very High Frequency</td>
</tr>
<tr>
<td>VMC</td>
<td>Visual Meteorological Conditions</td>
</tr>
<tr>
<td>VMS</td>
<td>Vibration Monitoring System</td>
</tr>
<tr>
<td>VOR</td>
<td>VHF Omni Directional Range navigation system</td>
</tr>
<tr>
<td>VSI</td>
<td>Vertical Speed Indicator</td>
</tr>
<tr>
<td>V_y</td>
<td>Best Rate of Climb Speed</td>
</tr>
<tr>
<td>V_1</td>
<td>Decision Speed on Takeoff</td>
</tr>
<tr>
<td>V_{NE}</td>
<td>Velocity Never Exceed</td>
</tr>
</tbody>
</table>
Appendix 4:

External Load Operations

Figure 3: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and Recovery Measures for External Load Operations.
**Threat 13.0: Fuel Exhaustion – External Load Operations**
The helicopter operates on minimum fuel load to maximize lifting capability, runs out of fuel and suffers an engine flame-out resulting in an accident

**Control 13.1: Fuel Reserve**
Maintain a minimum fuel reserve of 20 minutes at all times.

**Control 13.2: Low Level Light**
When available for the aircraft type, a fuel low level warning light must be fitted.

**Threat 14.0: Failure of Lifting Equipment – External Load Operations**
The lifting equipment fails and drops the load resulting in an accident on the ground

**Control 14.1: Lifting Equipment**
The aircraft operator must ensure the serviceability and certified safe working load of lifting equipment is adequate for the task and appropriate to the material used for the line.

**Control 14.2: Servicing Schedule**
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.

**Control 14.3: Visual Inspections**
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 discontinued from use.

**Control 14.4: Shackles**
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.
Threat 15.0: Inadvertent Load Release – External Load Operations
The load is inadvertently released in flight, falls to the ground and causes an accident

Control 15.1: Manual and Electrical Release Mechanism
The aircraft must have a serviceable cockpit manual and electric release mechanism and an external manual release at the hook.

Control 15.2: Standardized Controls
When practical for aircraft of the same or similar type, the aircraft operator must standardize electrical load release switches, particularly when located on the cyclic and collective controls.

Control 15.3: Guarded Release Switch
When available for the aircraft type, all electrical release switches must be guarded to prevent inadvertent activation.

Control 15.4: Load Construction
The aircraft operator must ensure that all loads are rigged by qualified personnel.
Pilots engaged in external load activities must comply with the following requirements:

- Successful completion of operator’s external load training program tailored to the vertical reference 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.

Where the external load moves are more than three per hour, comply with the following flight times:

<table>
<thead>
<tr>
<th></th>
<th>Single-pilot operation</th>
<th>Two-pilot operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-hour maximum flight time per flying period, followed by a 30-minute rest-break.</td>
<td></td>
<td>5-hour maximum flight time per flying period, followed by a 60-minute rest-break.</td>
</tr>
<tr>
<td>6-hour maximum flight time per calendar day.</td>
<td></td>
<td>8-hour maximum flight time per calendar day.</td>
</tr>
</tbody>
</table>

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.

The helicopter operator must have Standard Operating Procedures outlining all requirements of personnel engaged in the external load activity. The procedures must be relevant to the local environment and terrain being operated in.

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).

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 (compressors, rig breakdown, sample bags, etc). A load meter must be fitted to the aircraft if considered necessary during the pre-start risk assessment.

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.
**Threat 17.0: Line Fouling In Transit – External Load Operations**
The load becomes detached from the line or the line is flown empty which, when above a certain speed, causes it to stream up and rearwards into the tail rotor resulting in an accident.

<table>
<thead>
<tr>
<th>Threat 17.0: Line Fouling in Transit</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighted Lines</td>
<td>Maneuver Boundary Envelope</td>
</tr>
<tr>
<td>Never Exceed Speeds (V\textsubscript{NE})</td>
<td>Short Line</td>
</tr>
</tbody>
</table>

**Control 17.1: Weighted Lines**
The long-line must be suitably weighted if it is to be flown without a load attached. Implement pre takeoff checks which are designed to ensure flight crew involved in repetitive loads are aware of when the line is attached.

**Control 17.2: Never Exceed Speeds (V\textsubscript{NE})**
All applicable \( V_{\text{NE}} \) speeds must be briefed and understood by all flight crew prior to the commencement of operations. If the aircraft Air Speed Indicator (ASI) is calibrated in different units of measurement than the documented \( V_{\text{NE}} \) speeds, a separate risk assessment must be conducted and reviewed with a Competent Aviation Specialist prior to start.

**Control 17.3: Maneuver Boundary Envelope**
All safe transit speeds, the maximum angle of bank, the maximum allowable rate of descent and general handling associated with stable load operations must be briefed and understood by all flight crew prior to the commencement of operations.

**Control 17.4: Short-Line (<50 feet)**
Transit with a short-line and no load attached is not permitted.
## Threat 18.0: Ground Loss of Control – External Load Operations

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

### Threat Controls

<table>
<thead>
<tr>
<th>Threat 18.0: Ground Loss of Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 18.1: Ground Briefing</td>
</tr>
<tr>
<td>Control 18.2: Aircraft Ground Control</td>
</tr>
<tr>
<td>Control 18.3: Ground Personnel</td>
</tr>
</tbody>
</table>

### Control 18.1: Ground Briefing

The pilot must ensure all personnel involved in the external load activity are briefed prior to the commencement of operations. This brief must include all emergency scenarios that could involve the ground crew.

### Control 18.2: Aircraft Ground Control

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.

### Control 18.3: Ground Personnel

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.

## Defences 19.0: Aircraft Accident – External Load Operations

Mitigating defences in the event of an aircraft accident

### Defence 19.1: Flight Crew Helmets

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

### Defence 19.2: Flight Following

Positive continuous communication and flight following must be maintained with the aircraft either by ground support crew or designated flight following personnel. Operation normal calls must be scheduled at least every 30 minutes unless the risk-assessment requires a greater frequency.
Figure 4: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and Recovery Measures for Offshore Operations.
Appendix 5:

**Threat 20.0: Helicopter to Vessel Interface – Offshore Operations**

Helicopter operates to a vessel and crashes on deck

---

**Control 20.1: Helicopter/Ship Operations**

All helicopter-to-ship operations must be conducted in accordance with the standards contained in the International Chamber of Shipping (ICS) Guide to Helicopter/Ship Operations.

**Control 20.2: Vessel Operations**

Floating vessels include Floating Production Storage Offload (FPSO), Mobile Drilling Unit (MODU), Diving Support Vessels (DSV), Derrick barges and seismic vessels.

Measure the Pitch, Roll and Heave of floating vessels as close to helideck level and centerline as possible to provide accurate readings that can be communicated to the helicopter from the vessel, and verified by the crew as being within limits before landing.

---

**Control 20.3: Pitch, Roll and Heave (PRH) Limits for Landing**

For operations to floating helidecks, the aircraft operator must have industry validated pitch, heave and roll landing limits (such as the Helideck Certification Agency Helideck Landing Limits) documented in their Operations Manual.
### Threat 21.0: Night Controlled Flight Into Terrain/Water (CFIT/W) – Offshore Operations

The helicopter operating at night flies into the water whilst still in an airworthy and operational state.

#### Threat Controls

<table>
<thead>
<tr>
<th>Threat</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat 21.0: Night CFIT/W</td>
<td>Night Recency, Night Offshore Time, Night Offshore Procedures, Night Validation Flight</td>
</tr>
<tr>
<td>Night Medevac Policy, Radio Altimeters, Weather Radar</td>
<td></td>
</tr>
</tbody>
</table>

#### Control 21.1: Night Recency

All offshore crews rostered for night support must maintain a recency of three night deck landings every 90 days.

#### Control 21.2: Night Offshore Time

Flight crew must have 25 hours total night offshore time before operating in command offshore at night.

#### Control 21.3: Night Offshore Procedures

Night offshore operations must be flown with two qualified pilots, in a multi-engine aircraft that is operated and equipped for flight under Instrument Flight Rules. The aircraft operator must have SOPs for night offshore operations which include reference to stabilized approach criteria and missed approach/go-around protocol.

#### Control 21.4: Night Validation Flight

All new-build helidecks must have a night validation flight conducted by an approved aircraft operator that assesses the platform and helideck lighting. Consider the following when planning the evaluation flight:

- Use of experienced personnel such as Check and Training Flight Crew;
- Performing the flight as soon as practicable during operational start-up; and
- Assessing the night lighting against the surrounding ambient conditions.

#### Control 21.5: Night Medical Evacuation (Medevac) Policy

When required for the operation, the company must consult with the aircraft operator to develop a night Medevac policy. Flights should only be conducted in life threatening situations and where stabilization until first light is not an option. The final decision must be made by the Offshore Installation Manager (OIM) in consultation with medical staff and the aircraft operator.

#### Control 21.6: Serviceable Radio Altimeters

All offshore helicopters must be equipped with at least one radio altimeter with dual displays, with audio and visual alert both of which must be serviceable for any flight at night or flight conducted under IFR. This requirement supersedes what may be outlined in the regulatory approved MEL.

#### Control 21.7: Weather Radar

All offshore helicopters flown at night or under IFR must be fitted with color weather radar having a minimum range scale of 2.5nm with one half nm range scale graduations.
Control 22.1: Helideck Control – Helicopter Landing Officer (HLO) and Assistants

All offshore installations must have a HLO available for all helicopter movements with relevant duties and responsibilities clearly outlined in a current and up-to-date HLO Manual. Recurrent training must be scheduled every three years.

Any personnel designated as an assistant to the HLO must receive formalized training from an approved HLO, and where possible participate in periodic emergency drills.

In addition to standard PPE, all helideck personnel must wear and be identified by a high visibility vest.

Control 22.2: Helideck Inspection

All helidecks must have an annual helideck inspection conducted by a Competent Aviation Specialist or the aircraft operator. Documented findings and action plans resulting from any inspection must be retained by the HLO.

Prior to commencing operations to a new helideck, or when there is a new operator for an existing helideck, experienced and qualified personnel from the aircraft operator must perform an inspection and brief all relevant offshore personnel in the safe operating practices and procedures for the helicopter type being used.

Control 22.3: Helideck Design

All new helidecks must conform to the standards of ICAO Annex 14 Volume II Heliports and be designed to accommodate the largest helicopter anticipated for use in the life of the structure. Refer to CAP 437 ‘Offshore Helicopter Landing Areas’ and the ICAO Heliport Manual for standards and practices.

Bow mounted helidecks on FPSOs may require decks with a larger than normal diameter up to 1.5D (D = overall length of the helicopter with rotors turning) due to PRH considerations. Obtain advice from a Competent Aviation Specialist prior to the final design review.

Control 22.4: Helicopter Performance

Offshore helicopters must be flown to minimize exposure time over the helideck edge and must be operated to at least Performance Class 2 requirements at all times.

Control 22.5: Multiple Helicopters on Helideck Operations

A procedure for a second helicopter landing on a helideck must be included in the aircraft operator’s Standard Operating Procedures or Operations Manual.

Operations requiring the landing of a second helicopter to an offshore helideck must be risk assessed and approved by a company designated Competent Aviation Specialist prior to the activity.
### Control 23.1: Crew Hoist Experience

All personnel assigned to hoist operations must have completed an approved training program relevant to the task. A minimum of three hoist cycles within the past 12 months must form part of the training schedule for all crew members.

### Control 23.2: Training Program

The aircraft operator must establish a training program and minimum qualification criteria for all personnel involved in hoist operations, including, but not limited to: the flight crew, hoist operator and down-the-wire swimmer (where applicable).

The training program must include an initial competence course followed by annual refresher training.

### Control 23.3: Hoist Equipment

All role specific equipment including the hoist, lifting device, harnesses, PPE and associated tools must be maintained, tested and certified in accordance with the manufacturers approved maintenance program.

### Control 23.4: Night Hoist Offshore Operations

Conduct night hoist operations in aircraft that are specifically equipped to do the task (including auto-hover capability) and with a crew specifically trained in night hoist operations.

### Threat 23.0: Rescue Hoist Operations

The helicopter is performing hoisting operations and, through manipulative error, experiences an abnormal situation that results in an accident.

### Threat 24.0: Aircraft Fuel Complication – Offshore Operations

The helicopter experiences fuel supply complications resulting in engine flame-out and an accident.

### Control 24.1: Refueling System Inspection

An annual inspection of offshore installation fuel systems must be conducted by the company designated Competent Aviation Specialist or aircraft operator. The inspection must include a review of refueling procedures that cover daily testing, sampling and sample retention practices.

### Control 24.2: Offshore Alternates

One-way fuel computations and offshore-only alternate diversions must not be used unless the offshore destination has been approved for OEI landings by a Competent Aviation Specialist.

### Control 24.3: Fuel Testing

Pilots must take (or witness the taking of) a fuel sample from the delivery side and as close to possible to the delivery nozzle of all offshore refueling installations prior to each refueling operation. The fuel sample must be tested for water and contaminants as in Control 4.1.

### Threat Controls

List of controls related to threat 23.0 and 24.0.
Defence 25.1: Aircraft Flotation System

Offshore helicopters must be fitted with a pop-out flotation system. Install automatic inflation systems on the aircraft when available for the aircraft type.

Defence 25.2: Pop-out Windows

When an approved modification exists, emergency pop-out windows must be installed.

Defence 25.3: Emergency Exit Lighting System

When an approved modification exists, an emergency exit lighting system must be fitted to the aircraft.

Defence 25.4: Liferafts

Two approved liferafts that are reversible or self-righting, double chambered and capable of being tethered to the aircraft, must be carried and be readily accessible in the event of ditching. Each liferaft must have an overload capacity that is equal or greater to the total occupants carried in the aircraft. Preference is to be given to liferafts with inflatable floor and canopy.

Defence 25.5: Externally Deployed Liferafts

When an approved modification exists, externally deployed liferafts must be fitted to the helicopter with a means of activation located both internally and externally. Note — any liferaft assembly that can be deployed remotely by the pilots meets the intent of this control.

Defence 25.6: Life Jackets

Constant wear, single chambered (minimum) passenger life vests manufactured to an approved TSO must be worn at all times in offshore operations. Life vests with a crotch strap must be considered in the pre-start risk assessment.

Defence 25.7: Survival Suits

Survival suits certified for use by the local regulatory authority must be provided to crews and passengers for helicopter offshore operations in hostile environments and when required by a risk assessment.

Defence 25.8: Helicopter Underwater Escape Training (HUET)

All flight crew and passengers must complete a HUET course that includes the use of a Modular Egress Training Simulator (METS) at least every four years, unless local regulation requires greater frequency or an established internal variance process has been approved.

Defence 25.9: Public Address (PA) System

The helicopter must be fitted with a PA system of sufficient clarity and volume so that passengers can understand instructions from the crew at all times during flight.

Defence 25.10: Passenger to Crew Communication

Passengers must be able to communicate with the crew. Means of communication can include access to a headset for a designated passenger or carriage of a crew member.

Defence 25.11: Additional Offshore Safety Briefing

When the aircraft used for an offshore flight is configured differently to that shown in the video safety briefing, provide a verbal briefing covering the differences between the actual aircraft and the one shown in the video to all passengers prior to departure.

In addition to the briefing requirements contained in Control 6.6, include at least the following information in a video briefing prior to boarding of the aircraft for both onshore and offshore legs:

- Demonstration on the use of life jackets used in that helicopter;
- The proper use of survival suits, including the need to have suits fully zipped with hoods and gloves on during takeoff and landing, or as otherwise advised by the Pilot-in-Command;
- Demonstration of liferaft deployment and boarding;
- Demonstration of deployment of all survival equipment; and
- Boarding and disembarkation instructions.
Defence 25.12: Cabin Baggage

Only soft cover books or securely bound magazines can be taken on board the helicopter. Briefcases, laptop computers and newspapers are prohibited as carry-on baggage and must be secured in the baggage compartment.

Defence 25.13: Flight Following

Dedicated aircraft flight following must be provided by a person capable of initiating the Emergency Response Plan. The flight following must consist of constant radio contact being maintained, with aircraft reporting intervals detailing the aircraft position and altitude not exceeding 15 minutes.

An approved satellite system may be used in lieu of the flight following system. Set satellite reporting intervals to two minutes with higher reporting frequencies encouraged at lower levels.

Defence 25.14: Survival Kits

Offshore-specific survival kits that comply with local regulatory requirements must be carried and packed into aircraft liferafts.

Defence 25.15: Emergency Response Plan (ERP)

Offshore installations and vessels must make provision for aviation emergencies on and around their facilities when developing Emergency Response Plans.

Defence 25.16: Emergency Response Drills

Emergency drills (at a minimum desktop) with aviation related objectives must be conducted within 30 days of a project’s initiation, and then annually for ongoing operations.

Test the integrity of the ERP by conducting exercises on worst-case scenarios involving last-light, weather and aircraft disposition.

Test and validate bridging communications between the company, the aircraft operator and all SAR resources.

Defence 25.17: Last Light Limitations

Daytime offshore flights using single-engine and multi-engine helicopters not meeting Performance Class 2 must be scheduled so that they land 30 minutes prior to official sunset. The 30 minute timing must be reviewed during the pre-start risk assessment and take into account the following:

- Occupant survival time in the localized water conditions;
- Search and rescue resources available;
- Total call-out and recovery time; and
- Cumulative time taken for individual winch operations.

Defence 25.18: Night Time Offshore Passenger Flights

Perform a risk assessment with input from the aircraft operator before conducting night passenger flights. The risk assessment must include:

1. The existence, availability and effectiveness of available night SAR resources;
2. SAR response times; and
3. Survival times of personnel given environmental conditions and mitigating measures (such as survival suits). In this review it is expected that dedicated night SAR helicopters with full night hoisting capability would be available.

Defence 25.19: Linked Liferaft

For long-term operations, the company in consultation with the aircraft operator must consider using linked liferafts to supplement any hoist or other means of rescue.

Defence 25.20: Acoustic Beacon

All offshore helicopters must have an underwater acoustic beacon (pinger) that transmits when submerged. If equipped, the pinger must be attached to the CVR.

Defence 25.21: Re-breathers

Approved non-pressurized re-breathing equipment may only be used when crew and passengers have received training in its use and its deployment is covered in pre-flight safety briefings.
Night Vision Goggles (NVGs). A binocular appliance that amplifies ambient light and is worn by a pilot. The NVGs enhance the pilots’ 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.

Medevac. Medical Evacuation (Medevac) is a specific flight with the purpose of retrieving a patient in medical distress from injury or illness.

Applications
Role specific applications including, not limited to: Medevac, marine pilot transfer and cold environment pipeline patrol.
Threat 26.0: NVG Failure

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

Control 26.1: NVG Standard

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.

Control 26.2: NVG Power Supply

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

Control 26.3: NVG Compatibility

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.

Threat 27.0: Flight Considerations

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

Control 27.1: Weather

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.

Control 27.2: Flight Rules

Helicopters must be fully Instrument Flight Rules (IFR) compatible (refer to Controls 5.1 to 5.13 and Appendix 2) and certified for dual IFR operations in accordance with local regulatory requirements.

Control 27.3: Risk Assessment

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

Control 27.4: Dispatch Procedure

Develop and implement a flight dispatch procedure that covers mission development, flight planning, risk assessment, mitigation and authorization processes.
## Threat 28.0: Helicopter Compatibility

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

### Control 28.1: Helicopter Certification Status
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).

### Control 28.2: Helicopter Crewing
Helicopters must be crewed by two-pilots with dual controls and instruments for full IFR operations.

### Control 28.3: Helicopter Lighting
Helicopters must be equipped with a fully steerable searchlight (preferably infrared) capable of being operated from either pilot station.

### Control 28.4: Radar Altimeter
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.

### Control 28.5: Terrain Awareness Warning System (TAWS)
Helicopters must be equipped with a Terrain Awareness Warning System (TAWS) that meets the requirements of TSO-C194.

### Control 28.6: Autopilot
Helicopters must be equipped with a three-axis autopilot to relieve crew workload.

### Control 28.7: Moving Map
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.

### Control 28.8: Multi-engine Aircraft
Use a multi-engine aircraft when conducting flights on NVGs.

## Threat 29.0: Flight Crew Experience

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

### Control 29.1: Flight Crew Experience Requirements
In addition to Appendix 1 requirements, all flight crew must have a minimum of 50 hours of night (VFR or IFR), unaided flight time.

### Control 29.2: Flight Crew 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.

### Control 29.3: Pilot Command Time
The aircraft captain must have ten hours Pilot-in-Command NVG flight time logged.

### Control 29.4: Specialist Experience
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.

### Control 29.5: Crew Resource Management (CRM) Training
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.
Threat 30.0: Flight Crew Recency
A lack of recent NVG experience leads to a manipulative error and accident

Control 30.1: Flight Time Recency
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.

Control 30.2: Manipulative Recency
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.

Control 30.3: Flight Duration
Each pilot must not be scheduled to fly more than five hours on NVGs during any single flight duty period.

Threat 31.0: General NVG Considerations

Control 31.1: Operational Crew
Do not carry passengers on training or operational flights, other than those specifically authorized for the task by both the company and aircraft operator.

Control 31.2: Authorization
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.

Control 31.3: Standard Operating Procedures
Aircraft operators must have SOPs that define:
- NVG crew roles and responsibilities;
- Goggle/de-goggle procedures and limitations; and
- Emergency de-goggle procedures.
Figure 6: BARS Bow Tie Risk Model – Airborne geophysical survey operations are higher risk than other aviation activities in the resource sector. All proposed activities are subject to a detailed risk analysis that meets the standards of the company, aircraft operator and the IAGSA.
Threat 32.0: Personnel
Inadequate experience or high workload causes poor decision making and results in an accident

Control 32.1: Aircrew Experience and Recency
The following requirements are in addition to those listed in Appendix 1.

<table>
<thead>
<tr>
<th>Experience and Recency Requirement</th>
<th>Captain</th>
<th>Co-Pilot</th>
<th>Other crew</th>
<th>Footnote</th>
</tr>
</thead>
<tbody>
<tr>
<td>All BARS Appendix 1 requirements</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total time – geophysical</td>
<td>300 hours</td>
<td>10 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command/ICUS time – geophysical</td>
<td>300 hours</td>
<td>0 hours</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Command/ICUS on contract aircraft type</td>
<td>50 hours</td>
<td>0 hours</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Command/ICUS preceding 90-days on contract aircraft type</td>
<td>10 hours</td>
<td>0 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geophysical training program</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>Simulator training</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Helicopter Underwater Escape Training</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Survey Crew Resource Management</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Agricultural pilots with formal ratings provided by a regulatory authority, who have at least 500 hours of low level agricultural flying incorporating GPS line flying, may apply a 250 hour credit towards total Command time.

2. Alternatively successful completion of a geophysical line check of at least two hours (excluding use of ferry time within the preceding 90 days). Document flight crew competencies against established criteria.

3. Successful completion of a geophysical training program and where applicable a mountain flying course. Document flight crew competencies against established criteria. Where the aircraft is operating with a fuel system that has been modified from the original certification criteria, include a specific training module on fuel system management.

4. In addition to training on the actual aircraft, when reasonably available and supported by the client, flight crew must undergo periodic simulator training that includes low-level emergencies and marginal performance situations (including $V_{MCA}$).

5. HUET training must be conducted for all crew involved in over-water ferry flights and offshore geophysical operations.

Control 32.2: Flight Crew Remuneration
To remove unnecessary pressure to fly and potentially compromise minimum standards, flight crews must not be paid on the basis of hours or distance flown.

Control 32.3: Crew Complement
The minimum crew complement must be a pilot and operator. Single-pilot only operations must only be accepted after conducting a risk assessment which delivers mitigation measures acceptable to all. Where an observer is carried due to operating country requirements, the observer is to be considered part of the crew.

Control 32.4: Two-pilot Operations
Night surveys must be operated with a two-pilot crew. Conduct a pre-start risk assessment on two-pilot operations when:

- Performing low-level offshore surveys; and/or
- Areas where a high workload is anticipated with managing traffic and/or airspace.
Threat 33.0: Aircraft Equipment
Certified and appropriate equipment must be fitted and serviceable prior to departure on a survey flight

Control 33.1: Aircraft Canopy
To facilitate good lookout and field-of-view, the aircraft canopy and all transparencies must be clear, unscratched and serviceable throughout the activity.

Control 33.2: Upper Torso Restraints
Four-point upper torso restraints with lockable inertia reels must be provided to all aircraft occupants.

Control 33.3: Oxygen Supply
The aircraft must have continuous oxygen capability if unpressurized and operating above 10,000 feet AMSL.

Control 33.4: Supplemental Type Certificate (STC)
All role-specific equipment must be installed under an STC or Engineering Order.

Control 33.5: Radar Altimeter
Equip the aircraft with either a dual output radar altimeter or two independent radar altimeters, fitted with visual and aural height warnings, and with a variable height alert that can be set by the crew.

Control 33.6: Securing Cockpit Equipment
Any additional cockpit instrumentation (such as course deviation indication and/or heads-up instrumentation) must be properly secured and not obstruct the crew field-of-view. Instrumentation that requires input from a crew member must be within easy reach and within the normal operating field of vision.

Control 33.7: Aircraft Heater
The use of an aircraft heater must not be restricted for crew use in the interest of ‘clean’ data.
Threat 34.0: Survey Towed Device
Lifting equipment fails and the survey load drops to the ground causing an accident

Control 34.1: Helicopter External Load Requirements
Helicopter external load equipment such as towed arrays must follow all requirements contained within Appendix 4.

Control 34.2: Weak Links
Where a survey device is towed, install an approved weak link in the line that is certified for the purpose by the applicable regulatory authority and/or approved design/manufacturer facility.

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

The device’s data cable must be fitted in a similar manner with a suitably frangible link that releases from the aircraft when subjected to half the total mass of the towed device.

Control 34.3: Inspection Program
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.

Control 34.4: Sling Equipment
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.

Control 34.5: Synthetic Cables
Synthetic cables may be used if the operator can demonstrate that the cables do not exhibit excessive stretch when under load and are sufficiently weighted to ensure they do not interfere with the aircraft control surfaces or main/tail rotor at any time.
Threat 35.0: 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)

Control 35.1: Minimum Survey Heights

The survey height is defined as the height above obstacle level, such as the top of a jungle canopy in a tropical environment or ground level in desert conditions. Where the survey height is nominated below 100 meters for fixed wing, 60 meters for helicopters or 50 meters for a towed object, approval must be based on a risk assessment and agreed by all parties.

Control 35.2: Transit Altitude

Transit altitude must be above 500 feet above ground level.

Control 35.3: Survey Speed – Fixed Wing

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.

Control 35.4: Survey Speed – Rotary Wing

With the exception of takeoff and landings, helicopters must minimize flight inside the avoid curve of the published height velocity diagram or below single-engine fly-away speed for multi-engine helicopters. Where operations in this flight regime are unavoidable due to the type of survey and equipment, conduct a risk assessment including an assessment of the terrain.

Control 35.5: Turning Radius

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.

Control 35.6: Night Instrument Flight Rules (IFR)

All night surveys must be conducted in accordance with all night, IFR requirements detailed in this Standard.

Control 35.7: Minimum Temperature

The minimum ground temperature for operations must be −35 degrees Celsius.

Control 35.8: Monitoring Radios

Turn on radios during survey flights and select the appropriate ATC or area frequencies.

Control 35.9: Offshore Surveys

Offshore surveys require additional controls. Include the following:

- HUET training for all crew in the preceding four years;
- Ten hours of initial offshore survey training with a pilot who has at least 100 hours offshore survey experience;
- Five hours offshore survey time in the last 90 days, or flight check in lieu;
- Basic Instrument Flight techniques including Unusual Attitude recovery training;
- Minimum weather conditions of 5nm visibility and 1,000 feet ceiling;
- Additional risk assessment (see BIG for details); and
- Satellite flight following with a minimum two minute reporting interval.

Control 35.10: Performance Monitoring

Performance parameters including aircraft speed, height above terrain and drape must be periodically reviewed using data collected during the survey. Inspect deviations below minimum survey speed and minimum height. Take corrective actions to ensure deviations cease and the minimum safety margins are maintained. Determine the frequency of performance parameter reviews during the pre-start risk assessment.
Threat 36.0: 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

Control 36.1: Single-pilot Flight Time
In addition to BARS Control 1.8 and 1.9 (Flight and Duty Limits), limit single-pilot operations to five hours per day on actual survey (transit time excluded).

Control 36.2: Single-pilot Duties
The duties of the single-pilot must not be increased because of the absence of an on-board operator.

Control 36.3: Two-pilot Flight Time
In addition to BARS Control 1.8 and 1.9 (Flight and Duty Limits), limit two-pilot operations to eight hours per day on actual survey (transit time excluded).

Control 36.4: Fatigue Management Considerations
Include fatigue management in the pre-start risk assessment to ensure appropriate mitigation has been planned for. Consider the following localized influences:
- Crew rotation;
- Time zone changes during rotation travel;
- Extreme climate;
- Effect of altitude;
- Camp conditions; and
- Rest facilities.

Control 36.5: Accommodation
Appropriate accommodation, including non-share single rooms when possible, must be included during the pre-start risk assessment that covers fatigue management. The risk assessment must cover the ability of flight crew to gain uninterrupted rest when temperature, noise, darkness and any other applicable local conditions are considered.
Defences 37.0
Mitigating defences in the event of an accident during survey operations

Defence 37.1: Satellite Flight Following
All survey aircraft must be tracked during survey using a satellite-based tracking system set at two minute reporting intervals and which is continuously monitored on the ground. Voice communications equipment must be available as back-up. If the satellite tracking system fails, an alternate means of flight following must be established that is acceptable to the aircraft operator and the company.

Defence 37.2: Local Flight Following
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.

Defence 37.3: Emergency Response Procedures
Emergency Response Procedures must be developed for each survey and be included as part of the pre-start operational risk assessment.

Defence 37.4: Flight Crew Clothing
All crew must wear appropriate clothing for survey operations including:
- Non-synthetic long trousers and long sleeved shirt or appropriate flying suit;
- Cotton undergarments;
- Robust, enclosed shoes; and
- Access to felt lined parka, hood and mittens (for cold weather operations).

Defence 37.5: Crew Helmets
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).

Defence 37.6: Survival Pack
Carry a survival pack for all survey flights which is suited to the operating environment and includes a means to start a fire, a knife and a signaling mirror.

Defence 37.7: Life Jackets
Life jackets must be worn by all crew members if the survey is being conducted beyond autorotative or gliding distance from land.

Defence 37.8: Liferafts
Provide dual chamber, reversible, life rafts 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.

Defence 37.9: Underwater Escape Training
For both fixed wing and helicopter surveys over water, all crew members must undergo underwater escape training that includes use of a Modular Egress Training Simulator (METS) within the previous four years (unless local regulation requires greater frequency).

Defence 37.10: Flight Crew PLB
Flight crew operating in a hostile environment must carry voice-capable GPS Personal Locator Beacon (PLB) and any other necessary survival equipment on their person.
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