Template zur Verfügung gestellt von t.zilaji@aeroengineering.at

Arbeitsgruppe Absetzflugzeuge öaec

Risk Assessment Log

**A General**

**Responsible:** Operator, NAME

**Purpose:** Determination of risks associated with parachuting operations.

**Type of operation and brief description:**

Dropping of skydivers (solo and tandem) from aircraft XXX at altitudes of XXX ft AGL up to XXX ft MSL.

**Participants, working group:** Names of participants

**Preconditions, assumptions, simplifications:**

* Operations performed in accordance with the current Checklist based on this Risk Assessment in accordance with NCO.SPEC.105;
* System reliability and environmental conditions experienced in operator history is representative of future operation (constant likelihood of failures and hazardous conditions).

**Data used:**

* Performance data from performance calculations, based on aircraft flight manual data;
* Occurrences from operator history and online research.

**Description of the analysis method:**

* Qualitative analysis, group evaluations;
* Research for occurrences (e.g. accident reports) involving identified hazards, that allow conclusions for the current operation;
* Cross-check for completeness using checklist.

**External context:**

* Regulatory requirements

Regulation Air Operations – Part-NCO

Part-SERA

* Environmental conditions

See SOP;

* Stakeholders and their potential interest

Skydivers: Predictable availability, safe, coordinated jump operations;

Inhabitants of aerodrome and drop zone area: Low noise impact, no damage of third-party property on ground;

ATC: No disturbance of traffic flows.

**Internal context:**

* Types of aircraft

XXX

* Personnel and qualifications

Current XXX pilots with a minimum of XXX h airplane flight time,

Min. XXX with class rating for the operated aircraft + initial checkout for parachute dropping operations;

* Combination/similarity with other operations

none;

* Other RA used/considered/plugged in

none.

**Existing barriers and emergency preparedness:**

* Initial pilot checkout for parachute dropping operations;
* Availability of training and supervision on demand;
* Adapted checklist for parachute dropping operations;
* Use of pre-planned mass and balance and performance calculations
* XXX…

**Monitoring and follow-up:**

* Pilot meetings, update of RA when indicated by reports;
* XXX

**B Hazard Identification**

**Hazard ref. H1: Early jump Phase of operation: Climb**

**Risk evaluation:**

Qualitative analysis of operator experience shows, that non-compliance with checklist procedures can lead to skydivers jumping from the aircraft without approval of the PIC or without clearance from ATC. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Early jump | H1a | Non-compliance with checklist procedures |  |  |
| Disturbance of air traffic |  |
| H1b |  |
| Collision with other traffic |  |
| H1c |  |
| Outfield landing – injury |  |
| H1d |  |
| Outfield landing – damage of property |  |

**H1a**

Likelihood: x

Severity: x

**H1b**

Likelihood: Example: Research for similar occurrences has shown that actual collisions are extremely improbable due to an early jump (one case Northampton 1993). All occurrences found involved additional risk factors (formation flight, improper communication…). L(H1B) is therefore assumed as ‘extremely improbable’.

Severity: Example: Typical outcomes will severe injury or death of the skydiver and possibly also of occupants of the aircraft hit, given a severity ‘hazardous’.

**H1c**

Likelihood: x

Severity: x

**H1d**

Likelihood: x

Severity: x

**Conclusion:**

Maximum risk for hazard H1 with existing barriers in place falls in the XXX area (XXX).

Example: Tolerable risk for the operation. Currently no additional mitigations, but constant monitoring and re-evaluation of the effectiveness of barriers required.

**R1:**

**Hazard ref. H2: Opening of parachute Phase of operation: In-flight**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that parachutes may open from the wind or by accidental activation. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Opening of parachute | H2a | While opening main doors parachute can be accidently activated |  |  |
| Injury |  |
| H2b |  |
| Damage / compromised controllability of aircraft |  |

**H2a**

Likelihood:

Severity:

**H2b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H3: Birdstrike Phase of operation: Takeoff, landing**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that there is a possibility of birdstrikes during takeoff or landing. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Bird strike on takeoff | H3a | Birds on runway or in close proximity | Watch out for birds |  |
| Damage / compromised controllability of aircraft |  |
| H3b |  |
| injury |  |

**H3a**

Likelihood:

Severity:

**H3b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H4: Weight and balance not according to specifications of plane Phase of operation: Takeoff/jumprun**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, during any phase of the flight, but especially during takeoff and jumprun, there is a chance that the CG shifts in a way that causes loss of control of the aircraft. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Shift of CG | H4a | Movement around the aircraft, wrong loading, too many people in the door on exit | 1. Use seatbelts 2. Educate on max people in door |  |
| compromised or loss of controllability of aircraft |  |
| H4b |  |
| injury |  |

**H4a**

Likelihood:

Severity:

**H4b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H5: Skydivers staying on board Phase of operation: descend**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that when descending with parachutists with active AADs on board, there is a possibility of activation of these AADs inside the aircraft. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Opening of reserve parachute on board,  Different stall speed, landing path | H5a | Personal reasons, equipment failure  Weather  ATC | * Communication between pilot and jumpers when people are staying on board * Knowledge of AAD parameters |  |
| damage/compromised controllability of aircraft |  |
| H5b |  |
| Injury |  |
| H5c |  |
| Damage to equipment |  |

**H5a**

Likelihood:

Severity:

**H5b**

Likelihood:

Severity:

**H5c**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H6: midair collision Phase of operation: takeoff, flight, descend, landing**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that midair collisions can happen during all phases of flight. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Overlooking other aircraft,  Midair collision | H6a | Traffic pattern, climb… procedures deviating from standard procedures,  overlooking other aircraft due to restricted visibility | 1. Look outside and not leave your eyes inside the cockpit, especially during operations involving multiple aircrafts  2. Use different collision warning systems (FLARM, ADS-B, etc.)  3. Loud and clear communication between the aircrafts  4. Turn up some lights (strobes, taxi, landing) during flight to make yourself visible to other aircrafts |  |
| Loss of aircraft |  |
| H6b |  |
| Injury and death |  |

**H6a**

Likelihood:

Severity:

**H6b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H7: participant of ops walking in turning props Phase of operation: boarding/refuelling**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that during boarding or refueling with turning propellers, there is a risk of people walking in close proximity and getting hit by the prop. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Skydivers, tandem passengers, spectators, ground crew walking into turning props | H7a | People walking around unsupervised, | 1. Separating Refuelling area from area accessible by persons not part of the refuelling process If Possible  2. Pilot Keeps head up and looking out ready to Feather the engine,  3. Refueller keeps his head up and looks for possible persons approaching the AC during refueling ready to warn the pilot by spraying fuel on the windscreen  4. Helper Keeps looking for Persons approaching the AC and stops them before coming too close |  |
| Damage to aircraft |  |
| H7b |  |
| Injury and death |  |

**H7a**

Likelihood:

Severity:

**H7b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H8: collision between jumpers and aircraft Phase of operation: exit, descend, landing**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that there is a risk of a collision between jumpers and aircraft during exit, descend and landing. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Overlooking skydiver under open canopy or in freefall | H8a | Descending at high speed and crossing the flight path of a skydiver in freefall or under canopy | Know where the skydivers are  Look outside |  |
| damage/compromised controllability of aircraft |  |
| H8b |  |
| Injury and death |  |

**H8a**

Likelihood:

Severity:

**H8b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H9: Skydiver hung up on static line Phase of operation: jumprun**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that skydivers may be hung up on the static line after exit. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Skydiver is hung up on static line | H9a | Packing error or wrong exit position | * Communication with instructor * Cut skydiver loose |  |
| damage/compromised controllability of aircraft |  |
| H9b |  |
| injury |  |

**H9a**

Likelihood:

Severity:

**H9b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H10: Fatigue Phase of operation: all**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that pilots may experience fatigue while flying. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Fatigue of pilot, loss of situational awareness,.. | H10a | Dehydration, sleep deprivation, work load, stress | * Take breaks * Make sure you are hydrated and rested * eat |  |
| damage/compromised controllability of aircraft |  |
| H10b |  |
| injury |  |

**H10a**

Likelihood:

Severity:

**H10b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H11: Change of weather Phase of operation: all**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that pilots may experience fatigue while flying. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| High winds, thunderstorms, rain | H11a | Change of weather | * check weatherforecast * look outside * abort flight |  |
| compromised controllability of aircraft |  |
| H11b |  |
| injury |  |

**H11a**

Likelihood:

Severity:

**H11b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H12: lack of training Phase of operation: all**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that pilots may experience fatigue while flying. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Overwhelm  Making mistakes  Endangering people on board | H12a | Lack of training  Overestimate yourself | * training and checking |  |
| compromised controllability of aircraft |  |
| H12b |  |
| injury |  |

**H12a**

Likelihood:

Severity:

**H12b**

Likelihood:

Severity:

**Conclusion:**

**Hazard ref. H13: takeoff with too little fuel Phase of operation: all**

**Risk evaluation:**

Qualitative analysis of operator experience and online research show, that pilots may experience fatigue while flying. With existing procedures in place this leads to the following risks:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hazard** | **Risk ref.** | **Causes** | **Existing controls /**  **Ref.** | **Likelihood** |
| **Consequence** | **Severity** |
| Running out of fuel during flight | H13a | Not checking the fuel status before takeoff  Fuelling too little fuel | * checklist |  |
| Loss or compromised controllability of aircraft |  |
| H13b |  |
| injury |  |

**H13a**

Likelihood:

Severity:

**H13b**

Likelihood:

Severity:

**Conclusion:**

**C Mitigating Measures**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Phase of operation** | **Hazard ref.** | **Current treatment measures / controls** | **TM**  **Ref.** | **Max L** | **Further mitigation** |
| **Hazard** | **Max S** |  |
| Climb,  In-flight |  |  |  |  |  |
|  |  |
| In-flight |  |  |  |  |  |
|  |  |
| Descent  Landing |  |  |  |  |  |
|  |  |
| In-flight |  |  |  |  |  |
|  |  |
| In-flight |  |  |  |  |  |
|  |  |
| In-flight |  |  |  |  |  |
|  |  |