

Key Safety Principles for operation of experimental and developmental Airborne Wind Energy Systems

22nd April 2020

Introduction

The members of Airborne Wind Europe commit to adhere to the following Key Safety Principles for operation of experimental and developmental Airborne Wind Energy Systems (AWES).

The aim is to minimise the risk of a hazardous or catastrophic incident by reducing the probability and the consequence of such an incident. Catastrophic incidents are incidents that could result in one or more fatalities. Hazardous incidents are incidents with one failure away from catastrophic incident or that could result in third party human harm.

These principles do not replace any legal or technical safety requirements imposed on AWES developer.

1 Safety culture

Appropriate rigour shall be adhered to in all phases of design, production, test and operation.

Design, production and workmanship standards shall be followed as deemed appropriate in order to have a defined reference for evaluation and continuous improvement. Within the organization, a culture of full candour and integrity shall be implemented including a dedicated effort to ensure sufficiently conservative engineering assumptions. The risk mitigations applied shall be proportional to the inherent risks of the operation so that a level of safety that is acceptable to the developer and the respective competent authorities can be achieved.

2 Avoiding harm and damage

Appropriate measures shall be taken at all times to avoid serious harm of test personnel, visitors, and third parties. The risk of damage to property or third-party property shall be assessed and appropriate measures taken.

This can be accomplished by for instance the establishment of an exclusion zone, safety design features, development rigour or mitigation measures. The exclusion zone shall be large enough to allow for “safe crash” within the zone. Through safe design, redundancies or other safety factors, it shall be made extremely improbable that the airborne or any other part of the system exits the exclusion zone. Access to the zone during flight tests shall be controlled and/or restricted by appropriate measures.

In general, test personnel or site visitors shall be instructed on potential safety risks and be safely equipped where appropriate (e.g. safety goggles, gloves, shoes, warn vests or coloured wear).

Development rigour can be achieved for instance by design independence, review of design documents and test plans, and product assurance.

3 Avoiding collisions in airspace

Appropriate measures shall be taken to avoid collision with manned aircraft.

Appropriate measures can include for instance operations with an AWES operator who can perform an emergency landing if needed, danger zone via Notice to Airmen (NOTAM), restricted flight area, and lighting and marking to make the system visible to other aircraft.

4 Safe and approved testing

Tests shall only be performed if it is safe to do so under the existing weather conditions. Tests shall be performed in accordance with the applicable laws and regulations.

5 Qualified test personnel and rigorous testing procedure

Test personnel shall be qualified and trained to perform tests safely. Test personnel shall use rigour, e.g. by using checklists and manuals.

Tests shall be prepared, briefed, and debriefed with appropriate rigour. Data from tests shall be recorded and stored.

6 Incident Handling

An Emergency Response Plan (ERP) shall be in place in order to avoid escalating effects of an incident. The ERP includes e.g. a list of appropriate authorities or first responders to be notified in case of injury or death. The site shall be cleaned appropriately from debris.

Hazardous incidents should and catastrophic incidents shall be reported to the authorities and to Airborne Wind Europe. Corrective measures shall be implemented.

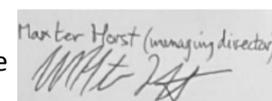
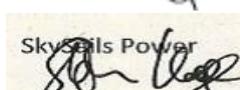
7 Continuous improvement

Even strict adherence to these guidelines cannot fully prevent incidents from happening.

However, the objective shall be to make the occurrence of catastrophic incidents extremely improbable, and to individually and collectively learn from any hazardous or catastrophic incident as to continuously improve the overall safety of AWES development and experimental operations.

Signatures

The Key Safety Principles are adhered to by the following members of AWEurope that design, produce, and operate AWES:

	Digitaal ondertekend door Michiel Kruijff Datum: 2020.05.06 09:15:27 CEST	Ampyx Power	e-kite		Marco Horst (managing director)
	Enerkite		kiteKRAFT		Florian Bauer
	Kitemill		Kitepower		
	Kiteswarms		Skysails Power		
	Skypull		Twingtec		