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Vertiports — Infrastructure and equipment for vertical take-off and landing (VTOL) of electrically powered cargo unmanned aircraft systems (UAS)

Vertiports — Infrastructure et équipements pour le décollage et l'atterrissage vertical (VTOL) des aéronefs cargo sans pilote (UAS) à propulsion électrique

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 17, *Airport infrastructure*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The demand for unmanned aircraft has been increasing in recent years for a variety of applications, including military and civilian [personal (hobby) and commercial] applications.

Particular focus has been placed on the logistics sector. The most difficult part of these operations is the departure and approach of the unmanned aircraft; and a vertiport is a device to support this. This document defines the requirements for constructing a vertiport. The components of the vertiport are assumed to be the following.

A vertiport system consists of two elements: a vertiport and a vertiport information system. The vertiport is connected to the vertiport information system; the vertiport information system is connected to the external system, and external system is connected to the unmanned aircraft system. In some cases, the unmanned aircraft system is directly connected to the vertiport to ensure safety during approach. The vertiport consists of software and hardware. The external system is responsible for assisting the unmanned aircraft system operator in making decisions and communicating with the vertiport information system and the unmanned aircraft system.

The vertiport communicates only with the vertiport information system and does not communicate directly with the external system; but it transmits information via the vertiport information system.

In addition, the use cases covered in this document are assumed to be logistics based on automatic navigation by non-visual flight; and where the cargo is stored at the landing site. However, this does not imply that the document cannot be applied to other use cases. This document does not cover vertiport operations and services covered by ISO 5015-2, developed by ISO/TC 20/SC 16 (UAS), which includes ground handling, interface with external systems, such as unmanned aircraft system traffic management service providers, and safety and quality of vertiport operators.

Vertiports — Infrastructure and equipment for vertical take-off and landing (VTOL) of electrically powered cargo unmanned aircraft systems (UAS)

1 Scope

This document defines the requirements for constructing a vertiport.

This document applies to vertiports of type A (micro) as defined in ISO 5015-2.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21384-4, *Unmanned aircraft systems — Part 4: Vocabulary*

ISO 5015-2, *Unmanned aircraft systems — Part 2: Operation of vertiports for vertical take-off and landing (VTOL) unmanned aircraft (UA)*

ISO 23629-5, *UAS Traffic Management (UTM) — Part 5: UTM functional structure*

ISO 23629-12, *UAS traffic management (UTM) — Part 12: Requirements for UTM service providers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21384-4, ISO 5015-2 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

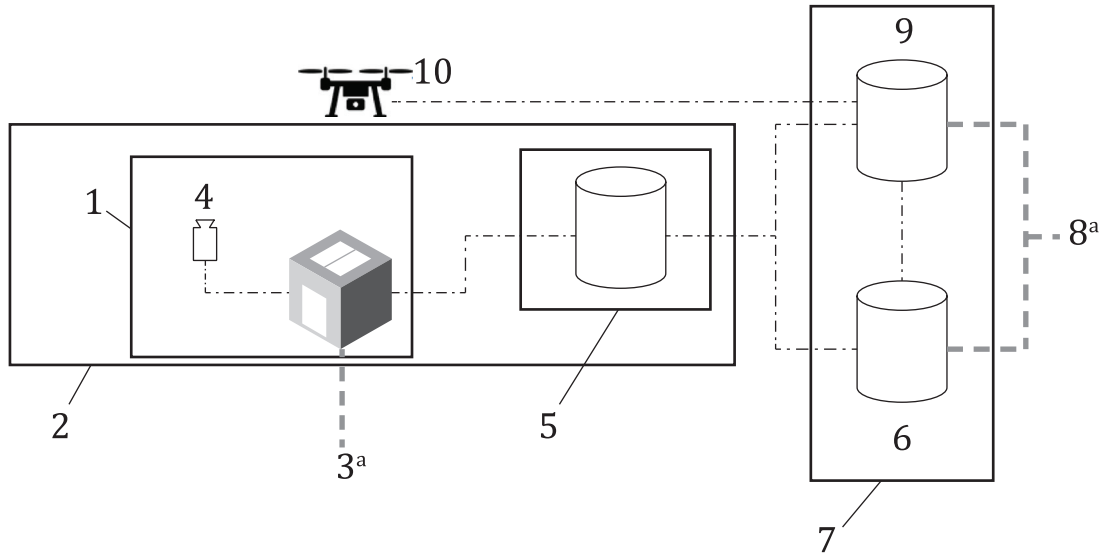
— IEC Electropedia: available at https://www.electropedia.org/

3.1
vertiport information system
VIS
system for centralized management of all information necessary for unmanned aircraft system (UAS) operations at the vertiports

Note 1 to entry: It manages the operational status of each vertiport.

Note 2 to entry: It communicates with the vertiport and the *external system (ES)* (3.2), and serves as an intermediary between them, but does not communicate with the UAS. It is assumed that there are cases where vertiport information system functions are included in the ES.

Note 3 to entry: The system composition including the vertiport information system and other systems is shown in Figure 1.



Key

1	vertiport
2	vertiport system
3	vertiport operator
4	peripheral devices (detectors, sensors)
5	vertiport information system (VIS)
6	vertiport booking system
7	external system
8	UAS operator
9	UTM/GCS
10	UAS
- - -	relation between subsystems and stakeholders
———	relation between subsystems
a	Stakeholders (SH).

Figure 1 — System composition

3.2
external system
ES
all actors related to vertiport operations other than the *vertiport operator* (3.3) and possible additional logistics management systems

Note 1 to entry: All actors (i.e. either users or service providers of digital information) necessary for unmanned aircraft system traffic management, shall be encompassed by the functional architecture in ISO 23629-5.

Note 2 to entry: The ES communicate directly with the *vertiport information system* (3.1).

3.3
vertiport operator
legal or natural person ensuring safe and secure functionality of the *vertiport system (VIS)* (3.1)

Note 1 to entry: Vertiport operators shall follow the requirements of ISO 23629-12.

3.4
operation interface
interface at the vertiport that is operated by the *vertiport operator* (3.3) to monitor and control the vertiport

3.5
dynamic information
information necessary for unmanned aircraft system operations at the vertiport, which is subject to frequent changes over time

Note 1 to entry: Dynamic information includes the operational status of the vertiport, the measured sensor information, and the availability of the storage location.

3.6
static information
information necessary for unmanned aircraft system operations at the vertiport, which is not subject to frequent changes over time

Note 1 to entry: Static information includes manufacturer information, administrator information, connectable *vertiport information systems (VIS)* (3.1) or other unmanned aircraft system traffic management actors, and other information that is initially configured and stable over time.

Note 2 to entry: Static information may be updated by the *vertiport operator* (3.3) or vertiport manufacturer through an established process.

3.7
obstacle
fixed (whether temporary or permanent) and mobile object, or parts thereof, that:

a) is located on an area intended for the surface movement of unmanned aircraft;

b) extends above a defined surface intended to protect unmanned aircraft in flight; or

c) stands outside those defined surfaces and that has been assessed as being a hazard to air navigation

4 Abbreviated terms

ES	external system
GCS	ground control system
GNSS	global navigation satellite system
SP	service provider
RTK	real time kinematics
UAS	unmanned aircraft system
UTM	UAS traffic management
VIS	vertiport information system
VTOL	vertical take-off and landing

5 Requirements for the vertiport, under the responsibility of the manufacturer

5.1 Design

5.1.1 Functional requirements

5.1.1.1 General and operation

The vertiport shall:

a) be able to detect abnormalities in the vertiport's surrounding environment, climate, and vertiport function operation, which can be used to respond to emergencies;

   The vertiport operator should address the operational safety aspects of an emergency, taking into account the legitimate interests of other statutory bodies such as the police and emergency services.

b) be highly visible, and uninvolved person shall know that it is a vertiport (e.g. it shall have an airplane warning light);

   The vertiport operator may use lights other than those used by airports, heliports or military airfields.

c) have its bearing load and shock resistance specified and clearly marked on the vertiport at the time of manufacture;

d) have its weathering resistance with respect to operational weather conditions specified and clearly marked on the vertiport at the time of manufacture;

e) be fixed to the intended surface independent of weather requirements;

f) be able to be used at the level of locally available electricity grid supply;

g) be able to detect the orientation and coordinates of the installation site;

h) be able to detect obstacles on the vertiport and, within the range that affect flight, surrounding the vertiport and send the information to the VIS;

i) be able to monitor weather conditions such as wind speed, wind direction, rainfall, and temperature;

   It shall be able to confirm the altitude of the wind speed measurement.

   Vertiport manufacturers shall follow the requirements of ISO 23629-12.

j) be able to communicate values of parameters measured by sensors to the VIS;

k) allow the vertiport manufacturer and vertiport operator to set the initial static information of the vertiport;

   This initial static information may be divided into two categories.

   1) Initial static information set by the vertiport manufacturer that vertiport operator shall not be able to change.

      This category may include such information like vertiport's fixed ID.

   2) Initial static information set by the vertiport operator when preparing the vertiport for use.

      This category may include such information like VIS, access information, IP address, Wi-Fi connection settings, license key, etc.

l) be able to measure GNSS signal strength;