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

iTeh STANDARD PREVIEW
Aéronefs sans pilote —
Partie 2: Exploitation des vertiports pour les aéronefs télépilotes (UA)
à décollage et atterrissage vertical (VTOL)

[ISO 5015-2:2022](https://standards.iso.org/iso/5015-2-2022)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 16, *Unmanned aircraft systems*.

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

0.1 General

This document belongs to a series of International Standards related to vertiport infrastructures and operations, developed by ISO/TC 20, SC 16 and SC 17.

A related standard under development by TC 20 is ISO 5491¹⁾[1].

0.2 Background

Vertiport operations relate to landing, ground movement, parking, and subsequent take-off and departure of vertical take-off and landing (VTOL) aircraft, electrically powered (eVTOL) or equipped with other propulsion systems. In this document, the abbreviated term VTOL encompasses eVTOL.

Vertiport operations also comprise ground handling and servicing, including energy replenishment.

Maintenance and operations of VTOL unmanned aircraft (UA), as well as UAS traffic management (UTM) services, are not covered by this document, although the vertiport operator often needs to exchange information with both the unmanned aircraft system (UAS) or operators of VTOL aircraft and UTM service providers (UTM SPs).

UTM SP are also called, in different regions of the world, “providers of services for UAM (PSU)” or “U-space service providers (USSP)”. These terms are equivalent in this document.

This document hence focuses on the requirements applicable to the vertiport operator for the safety, security and compliance of the provided services, as well as protection of related data and information. These requirements include organizational structure, accountabilities, policies and procedures.

A vertiport operator contributes to the safety, security and efficiency of operations of UAS or other VTOL aircraft suitable for operations over urban areas, supporting the fulfilment of the responsibilities of the UAS or VTOL aircraft operator. Operational procedures and requirements for the UAS operator are contained in ISO 21384-3²⁾. Although vertiport operations are established considering the needs of VTOL UA, these services can also support operations of properly equipped manned VTOL aircraft.

These VTOL aircraft can be employed for aerial work or transport, including of passengers.

One organization can operate several vertiports at different locations.

0.3 Types of vertiports

Vertiport operations relate to landing, ground movement, parking and subsequent take-off and departure of VTOL aircraft, electrically powered or equipped with other propulsion systems.

Vertiport operations also comprise cargo and passenger ground handling and aircraft servicing (e.g. power supply), including energy replenishment (e.g. battery recharging or refuelling).

The vertiports can be open to international or domestic public use or for private use.

The vertiports can be certified or licensed by the competent authority, based on applicable legislation.

Vertiports can be distinguished as type A (micro, used for logistics or for energy replenishment) and type B [small vertiports, including for urban air mobility (UAM) mainly of passengers], both serving aircraft capable of VTOL, including electrically powered, with a maximum take-off mass (MTOM) of up to 150 kg and 3 175 kg, respectively (i.e. 7 000 lbs.).

Large vertiports in type C are essentially heliports designed primarily to serve large rotorcraft equipped with internal combustion engines. But, when complemented by additional specific equipment or provisions, type C vertiports can also serve electrically powered manned or unmanned VTOL aircraft.

1) Under preparation. Stage at the time of publication: ISO/DIS 5491:2022.

These three types are summarized in [Table 1](#).

Table 1 — Types of vertiports

Vertiport type	A (micro)	B (small)	C (large)
Serving unmanned VTOL aircraft with features			
MTOM	150 kg	3 175 kg (7 000 lbs)	unlimited
Maximum passenger number	0	9	unlimited
Normal (Vno) or maximum operating Vmo) speed	80 km/h (80 kn calibrated airspeed (KCAS))	460 km/h (250 KCAS) during horizontal cruise	unlimited
Pressurized cabin or compartment	No	No	possibly
Related vertiport infrastructure and equipment standards	ISO 5491 ^[1]	TBD	Several standards produced by ISO TC 20, in particular for ground support equipment (GSE)

NOTE 1 Type A vertiports can be portable or fixed.

NOTE 2 Type A vertiports are intended for logistics applications including inside urban areas. Type B vertiports can also serve passenger-carrying VTOL aircraft, including traditional rotorcraft specified in EASA/FAA CS/FAR 27^{[3][4]}. Type C vertiports are intended to serve VTOL aircraft of any mass, including large rotorcraft. Limitations for users can derive from environmental regulations (e.g. noise) or from decisions by the vertiport operator (e.g. provide or not refuelling facilities).

NOTE 3 Type A vertiports are intended to serve UA of MTOM up to level V in paragraph 6 of ISO 21895^[5].

NOTE 4 3 175 kg MTOM is consistent with the threshold separating small rotorcraft from large rotorcraft, the former in FAR/CS 27^{[3][4]} and the latter in FAR/CS 29^{[6][2]}. Furthermore, nine is the maximum number of passengers allowed under FAR/CS-27^{[3][4]}.

NOTE 5 ISO 5491^[1] provides standards for the exchange of digital information between the vertiport and the UA.

0.5 Content of this document

This document contains requirements that can be used by an organization to provide safe, secure and efficient vertiport operations.

This document includes requirements on qualification and training of personnel, vertiport operation, maintenance, and competence of vertiport maintenance and of ground handling staff as well as noise around the vertiport and organizational requirements including occurrence reporting and safety, security and privacy.

This document does not include requirements specific to other topics, such as those for quality, occupational health and safety (OH&S), social responsibility, environmental matters beyond noise or financial management, or use of the electro-magnetic spectrum, though its elements can be aligned or integrated with those of other management systems.

In this document, the following verbal forms are used:

- a) “shall” indicates a requirement;
- b) “should” indicates a recommendation;
- c) “may” indicates a permission;
- d) “can” indicates a possibility or a capability.

Information marked as “NOTE” is for guidance in understanding or clarifying the associated requirement.

Unmanned aircraft systems —

Part 2:

Operation of vertiports for vertical take-off and landing (VTOL) unmanned aircraft (UA)

1 Scope

This document specifies the requirements for vertiport operations (e.g. removal of contaminants, noise) and interface with an unmanned aircraft system (UAS) or vertical take-off and landing (VTOL) aircraft operators and with UAS traffic management (UTM) service providers (SPs).

This document is applicable to operations of vertiports belonging to any type, supporting:

- a) demonstration of compliance with applicable regulations of vertiport operations to aviation authorities or other public authorities, as a possible acceptable means of compliance (AMC), when applicable regulations require such involvement from the authority and when the authority considers this document acceptable;
- b) attestation of compliance of vertiport operations by qualified entities or other accredited, competent and independent third parties, supporting the safety risk assessment of the UAS operations required by regulations, in particular when high level of assurance robustness is required;
- c) attestation of compliance of vertiport operations by qualified entities or other accredited, competent and independent third parties even in the absence of any applicable regulation.

This document also covers safety of the vertiport operator and quality of data provided by the vertiport operator to other entities (e.g. UAS operators, service providers of aeronautical information, providers of UTM services).

Aspects that are not covered by this document are:

- requirements for operational procedures of UAS;
- requirements for physical characteristics and equipment for vertiports;
- requirements for UTM SPs.

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21384-4 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 helicopter

aerodrome or defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters

Note 1 to entry: The definition is taken from Reference [8]. Type B vertiports can also be heliports, if intended to support, in addition to electrically powered vertical take-off and landing (VTOL) aircraft, also helicopters powered by internal combustion engines. Conversely, type C heliports can be complemented by specific equipment (e.g. battery chargers) to also serve electrically powered VTOL aircraft.

Note 2 to entry: Helicopters belong to the VTOL family. VTOL aircraft or rotorcraft of unlimited mass and performance can operate at type C vertiports.

Note 3 to entry: European Aviation Safety Agency (EASA) Special Condition SC-VTOL-01[9] defines a vertiport as an area on land, water, or structure used or intended to be used for the landing and take-off of VTOL aircraft.

3.2 instrument approach

approach and landing operation using instruments for navigation guidance based on airborne, ground-based or satellite-based equipment or combination thereof

Note 1 to entry: The definition is adapted from Reference [10].

3.3 international vertiport

vertiport designated by a state in whose territory it is situated, as a vertiport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine, and similar procedures are carried out

Note 1 to entry: The definition is adapted from Reference [11].

Note 2 to entry: Vertiports can be international.

3.4 open to public use

<vertiport> accessible on equal terms and conditions to use by civil operators of vertical take-off and landing (VTOL) aircraft

Note 1 to entry: The definition is adapted from Reference [12].

Note 2 to entry: Formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are not normally available.

Note 3 to entry: Vertiports can be open to public use, but use can be limited to certain operations or types of users, and a prior permission or approval by the *vertiport operator* (3.6) can also be required.

3.5 for private use

<vertiport> accessible only to one particular person (e.g. the owner) or a restricted group of users, authorized by the *vertiport operator* (3.6)

Note 1 to entry: The definition is adapted from Reference [12].

Note 2 to entry: Vertiports can be reserved to private use.

3.6**vertiport operator**

legal or natural person operating or proposing to operate one or more vertiports

Note 1 to entry: The definition is adapted from Reference [13].

4 Abbreviated terms

AMC acceptable means of compliance

COMO compliance monitoring officer

DAL design assurance level

eVTOL electrically powered VTOL

HT head of training

IUEI intentional unauthorized electronic interaction

MTOM maximum take-off mass

SAFO safety officer

SECO security officer

SLA service-level agreement

SP service provider

UA unmanned aircraft [ISO 5015-2:2022](https://standards.iteh.ai/catalog/standards/sist/90c35491-7e1a-437a-8064-667dd99c69fb/iso-5015-2-2022)

UAM urban air mobility

UAS unmanned aircraft system

UTM UAS traffic management

UTM SP UTM service provider

VTOL vertical take-off and landing

5 Privacy and data protection requirements

All vertiport operators shall ensure that:

- a) the relevant data privacy regulations and laws have been taken into consideration;
- b) suitable procedures are in place to securely store or dispose of all data gathered during service provision and to avoid that data are distributed to non-eligible entities.

NOTE This data can include, for example, the identity of passengers, addressees of cargo or intentions of operators of VTOL aircraft.

6 Security

6.1 Requirements for all vertiport operators

Taking relevant security regulations into consideration, all vertiport operators shall:

- a) ensure that their facilities, systems and procedures take into account applicable security requirements, including personnel reliability and security;
- b) prevent access of unauthorized persons to vertiport facilities, systems and equipment, including when no personnel are inside the facilities;
- c) establish systems and procedures to permit access and egress by authorized persons, including operational staff and customers delivering or retrieving cargo;
- d) ensure that all equipment for vertiport operation, when not in use, is stored in a secure place;
- e) ensure that any communication link supporting vertiport operations is secured and ensured as sufficient to:
 - 1) achieve and maintain the required safety for UAS operations;
 - 2) if applicable, be consistent with the security requirements of the UTM SPs with which the vertiport operator exchanges data.

NOTE Systems and procedures for customers to deliver or retrieve cargo can be covered by a service-level agreement (SLA) with the UAS cargo operator.

6.2 Additional requirements for operators of type B vertiports

In addition to [6.1](#), all operators of type B vertiports shall:

- a) address the structure, responsibilities, processes and procedures that promote and establish an environment and culture of continuing improvement and enhancement of operation security;
- b) appoint a person as security officer (SECO);
- c) designate the SECO based on professional qualities and, in particular, expert knowledge of laws, regulations and practices on national security, aviation security and cybersecurity and the ability to fulfil the assigned tasks;
- d) train and qualify personnel to effectively recognize and respond to possible acts of unlawful interference against provided services;
- e) ensure that personnel involved in vertiport operations or handling of sensitive data are suitably vetted;
- f) establish procedures for checking identity of passengers before allowing them to access the facilities;
- g) establish procedures to report to the competent authority any information on observed security occurrences, in a manner that would allow a further impact analysis by the authority, if appropriate.

NOTE 1 The SECO can be or not be an employee of the vertiport operator.

NOTE 2 A single SECO can perform such a function on behalf of several vertiports or several vertiport operators, providing that no conflict of interest would arise.

NOTE 3 The SECO can fulfil other tasks and duties in the organization, providing that any such tasks and duties do not result in a conflict of interest. Therefore, the SECO can be responsible, for example, for data protection or safety management, but not for service provision, maintenance or other activities related to production or operations.

NOTE 4 Various types of civil aviation operations present different levels of security threats. Unless any other action (such as screening of a passenger or their baggage) is required by any security regulation, checking the identity of passengers before boarding is sufficient to conform to this document at type B vertiports.

6.3 Additional requirements for operators of type C vertiports

In addition to 6.1 and 6.2, all operators of type C vertiports shall:

- a) ensure security through a threat-based, risk-managed approach under which to assess and reduce their own security risks, threats and impacts;
- b) ensure that the security system includes a risk policy that is transparent, predictable and controllable, focused on the largest risks and equitable;
- c) assess the information systems essential for vertiport operation, against any potential intentional unauthorized electronic interaction (IUEI) security threat and vulnerability that can result in an unsafe condition;
- d) ensure that the assessment includes as a minimum:
 - 1) determination of the security environment for the information security of the vertiport systems;
 - 2) identification of the relevant assets or systems;
 - 3) identification of the attack paths;
 - 4) assessment of the safety consequences of the security threat to the affected assets;
 - 5) evaluation, by considering the existing security protection means, of the level of threat that would have an impact on safety;
 - 6) determination of whether the risks, which are the result of the combination of the severities and the potentiality to attack (or, inversely, the difficulty of attacking), are acceptable:
 - i) if they are acceptable, preparation of a justification statement, including the means to maintain the risk at an acceptable level;
 - ii) if they are not acceptable, analysis of the proposed means of mitigation to ensure an acceptable level of safety;
 - iii) implementation of means of mitigation;
 - iv) evaluation of the effectiveness of the means of mitigation with respect to the level of risk (combination of the level of threat and severity of the threat condition);
 - 7) iteration from point 1) until all the residual risks are acceptable;
- e) establish procedures ensuring that the results of security assessments lead to a statement that the vertiport has no identifiable vulnerabilities, or to documented implementation of sufficient mitigation measures;
- f) provide, when mitigation measures were necessary, sufficient grounds for evaluating that the residual security risk is acceptable;
- g) establish procedures to make the documentation on the means of mitigation available in a timely manner to the competent authority when requested by the latter;
- h) develop instructions for personnel and users to maintain the information security risk of the vertiport operations at an acceptable level, after the entry into service of the vertiport or modification thereof.