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## Unmanned aircraft systems — Part 3: Operational procedures

*Aéronefs sans pilote —*

*Partie 3: Modes opératoires*

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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 document 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](http://www.iso.org/directives)).

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

This second edition cancels and replaces the first edition (ISO 21384-3:2019), which has been technically revised.

The main changes are as follows:

- [Clause 2](#): addition of normative references;
- [Clause 3](#): addition of several terms and definitions;
- [5.1](#): addition of applicable management systems and equipment requirements;
- [5.2](#): major restructuring of the subclause, addition of requirements for operators under different preconditions and specified tasks for different personnel to be conducted;
- [9.1](#): designation of a remote pilot in control added;
- [9.4](#): addition of requirements for handovers of functions and responsibilities, precautions for the operation of multiple UA by one remote pilot, communication and airborne functions for UTM;
- [9.5](#): addition of new subclauses on organizational, operational and technical requirements for external service regarding UTM and C2CSP;
- [Clause 11](#): new clause on conflict management including operational charts and descriptions.

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](http://www.iso.org/members.html).

## Introduction

This document outlines requirements for unmanned aircraft (UA) operational procedures which, when applied together with any other current and future standard on unmanned aircraft systems (UAS), form a robust UA safety and quality standard. This document applies to all commercial UAS regardless of size, categorization, application or location and represents the international best practice for the safe operation of all commercial UAS. This document is structured in a way to provide a logical pathway from core principles to specific requirements.

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# Unmanned aircraft systems —

## Part 3: Operational procedures

### 1 Scope

This document specifies the requirements for safe commercial unmanned aircraft system (UAS) operations, including the external safety-critical service providing command and control (C2) link.

### 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 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

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

ISO 23629-12:2022, *UAS traffic management (UTM) — Part 12: Requirements for UTM service providers*

ISO 23665, *Unmanned aircraft systems — Training for personnel involved in UAS operations*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21384-4 and the following apply. [standards.iteh.ai/catalog/standards/sist/c505523e-0289-4f24-8f0d-c9d06247f1ff/iso-21384-3](https://standards.iteh.ai/catalog/standards/sist/c505523e-0289-4f24-8f0d-c9d06247f1ff/iso-21384-3)

ISO and IEC maintain terminological 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

##### **C2 Link communications service provider**

##### **C2CSP**

entity which provides a portion of or all of the *C2 Link* (3.4) service for operation of an UAS

Note 1 to entry: The definition is adapted from Reference [16].

#### 3.2

##### **designated operational coverage**

##### **DOC**

volume where the *C2 Link QoSD* (3.9) meets the *C2 Link* (3.4) specified performances and supports the corresponding intended UAS operations

Note 1 to entry: The definition is adapted from Reference [16].

#### 3.3

##### **collision avoidance**

third layer of conflict management which activates when the separation mode has been compromised

Note 1 to entry: The definition is adapted from Reference [17].

### 3.4

#### **C2 Link**

command and control link service

telecommunication service provided for the purpose of supporting command and control of the aircraft

Note 1 to entry: The definition is adapted from Reference [16].

### 3.5

#### **crew resource management**

##### **CRM**

utilization of all resources available to the crew to manage human error

### 3.6

#### **DAA system**

detect and avoid system

system that supports the remote pilot to see, sense or detect conflicting traffic or other hazards and take the appropriate action

### 3.7

#### **external service**

service and related provider, necessary for the safety of the UAS flight, encompassing:

- a) *command and control link communication service provider (C2CSP)* (3.1);
- b) other operation support services, whose purpose is to support a single flight but not to manage traffic;
- c) UTM services

Note 1 to entry: The definition is adapted from Reference [20].

Note 2 to entry: Additional information on external services is provided in [Annex B](#).

Note 3 to entry: Only the safety critical C2CSP is covered in this document.

Note 4 to entry: UTM services and non-safety-critical operation support services are covered in ISO 23629-12.

### 3.8

#### **quality of service**

##### **QoS**

totality of the characteristics of an entity that bear on its ability to satisfy stated and implied needs

Note 1 to entry: The definition is adapted from Reference [16].

### 3.9

#### **quality of service delivered**

##### **QoSD**

statement of the *QoS* (3.8) achieved or delivered to the UAS operator by the *C2 Link communications service provider (C2CSP)* (3.1)

Note 1 to entry: The definition is adapted from Reference [16].

### 3.10

#### **quality of service experienced**

##### **QoSE**

statement expressing the *QoS* (3.8) that remote pilots believe they have experienced

Note 1 to entry: The definition is adapted from Reference [16].



**3.11**  
**quality of service required**  
**QoSR**

statement of the *QoS* (3.8) requirements of the UAS operator to the *C2 Link communications service provider (C2CSP)* (3.1)

Note 1 to entry: The definition is adapted from Reference [16].

**3.12**  
**remain-well-clear**

ability to detect, analyse and manoeuvre in order to ensure that a UA is not being operated in such proximity to other aircraft as to create a collision hazard

**3.13**  
**remote pilot in command**  
**RPIC**

pilot designated by the operator as being in command and charged with the safe conduct of a flight

**3.14**  
**safety assurance**

set of activities providing for system monitoring, measuring, assessment, and corrective action to assure the effectiveness of risk controls

**3.15**  
**safety management system**  
**SMS**

systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures

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

**3.16**  
**safety promotion**

set of activities providing guidance for training and communication to promote safety as a core value in the organization

**3.17**  
**safety risk management**

SRM

set of activities using task analysis, hazard identification, risk analysis, and risk assessment to develop risk controls

**3.18**  
**separation provision**

second layer of conflict management and tactical process of keeping aircraft away from hazards by at least the appropriate separation minima which is only used when *strategic conflict management* (3.20) (i.e. airspace organization and management, demand and capacity balancing and traffic synchronization) cannot be used efficiently

Note 1 to entry: The definition is adapted from Reference [17].

**3.19**  
**service level agreement**  
**SLA**

enforceable agreement between the *C2 Link communications service provider (C2CSP)* (3.1) and the UAS operator covering the safety, performance, coverage and security of the *C2 Link* (3.4) provision as required for the RPAS operator's intended operations

Note 1 to entry: The definition is adapted from Reference [16].

### 3.20

#### **strategic conflict management**

first layer of conflict management that is achieved through the airspace organization and management, demand and capacity balancing and traffic synchronization components

Note 1 to entry: The definition is adapted from Reference [17].

### 3.21

#### **unmanned aircraft accident**

occurrence associated with the operation of an unmanned aircraft which takes place between the time the aircraft is ready to move with the purpose of flight until it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

- a) a person is fatally or seriously injured as a result of direct contact with any part or exposure to any emission of the UA or other component of the UAS, including parts which have become detached from the aircraft; or
- b) the aircraft sustains damage or structural failure which prevents safe operation

### 3.22

#### **unmanned aircraft incident**

occurrence, other than an *unmanned aircraft accident* (3.21), associated with the operation of an aircraft which affects or can affect the safety of operation, including the loss of unmanned aircraft

### 3.23

#### **VLL**

very low level

airspace below the minimum heights for VFR traffic as established by the competent authority

## 4 Abbreviated terms

AIS	aeronautical information service
ANSP	air navigation service provider
ATS	air traffic service
BVLOS	beyond visual line-of-sight
CofA	certificate of airworthiness
COMO	compliance monitoring officer
DAL	design assurance level
EVLOS	extended visual line-of-sight
FW	firmware
FOD	foreign object debris
GNSS	global navigation satellite system
IFR	instrument flight rules
ISMS	information security management system
MCM	maintenance control manual
MEL	minimum equipment list

NOTAM	notice to airmen
OEM	original equipment manufacturer
PIC	pilot in command
RF	radio frequency
RPS	remote pilot station
SAFO	safety officer
SECO	security officer
SW	software
UA	unmanned aircraft
UAS	unmanned aircraft system
UTM	UAS traffic management
VLOS	visual line-of-sight
VO	visual observer

## 5 Safety and security

### 5.1 General

UAS operators and providers of safety critical external services shall implement an SMS and an ISMS as standard practice regardless of the type of UAS operated or size of operation. Both SMS and ISMS are comprehensive, process-oriented approaches to managing safety and security throughout an organization.

Any machine or equipment used at the UAS operator's or service provider's premises, facilities or workshops, shall be designed according to ISO 12100 or equivalent, to be safe for their intended use by involved personnel.

NOTE 1 Safety management systems for occupational health and safety of the personnel are defined in ISO 45001.

NOTE 2 Information security management systems are described in ISO/IEC 27001.

NOTE 3 Aviation safety management, as defined in Reference [12], has instead the purpose of protecting the safety of third parties, in the air or on the ground, during UAS operations.

### 5.2 Safety

#### 5.2.1 Safety policy

A safety policy shall be defined for UAS operators and providers of external services to accomplish their goals. Human error in UA operation and supporting system management can be controlled by a safety policy.

The policy shall be complemented by procedures and organizational structures for safety risk management, safety assurance and safety promotion.

### 5.2.2 Requirements for operators conducting UAS operations in VLOS or EVLOS

All operators conducting UAS operations in VLOS or EVLOS shall:

- a) address the structure, responsibilities, processes and procedures that promote and establish an environment and culture of continuing improvement and enhancement of safety;
- b) appoint a person as COMO;
- c) appoint a person as SAFO;
- d) designate the COMO and the SAFO based on professional qualities and expert knowledge of laws, regulations and practices on safety of unmanned aviation and the ability to fulfil tasks respectively referred to in [5.2.5](#) and [5.2.6](#);
- e) train and qualify personnel on safety management related to intended operations;
- f) establish procedures for prescriptive safety including as a minimum:
  - 1) monitor and assess changes to regulations which can affect operations;
  - 2) establish evidence that all applicable regulations are complied with;
- g) establish procedures to support reactive safety through:
  - 1) maintain records of any operational activity for at least three months (can be longer if required by regulations or because the State authority competent for the matter has opened an accident or incident investigation);
  - 2) provide in a timely manner any information required by the authority;
- l) establish procedures for proactive safety including as a minimum:
  - 1) the possibility for staff, customers, subcontractors or other partner SPs to report any relevant and perceived safety occurrence;
  - 2) mandatory reporting of safety occurrences to the competent authority, based on applicable regulations;
  - 3) voluntary reporting to the competent authority of any additional and relevant observed safety occurrence, in a manner that would allow a further safety analysis by the authority, if deemed appropriate by the latter;
  - 4) collection of received or originated safety occurrence reports;
  - 5) timely feedback to originators of the report;
  - 6) storage of received or originated safety occurrence reports;
  - 7) protection of related information, in particular identity of the author of the report, in accordance with [Annex A](#);
  - 8) dissemination of safety information to involved personnel and affected stakeholders;
  - 9) taking decisions, implementing and monitoring effect of corrective actions originated by received reports;
- v) establish procedures for interorganizational safety management, allowing exchange of safety information with affected stakeholders.

NOTE 1 The COMO or SAFO can be or not be employees of the UAS operator.

NOTE 2 A single COMO or single SAFO can perform such a function on behalf of several organizations, providing that no conflict of interest arises.