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Aerospace series - Unmanned Aircraft Systems - Part 006: Means to terminate flight, requirements, and verification

Luft- und Raumfahrt - Unbemannte Luftfahrzeugsysteme - Teil 006: Mittel zum Flugabbruch, Anforderungen und Prüfverfahren

Série aérospatiale - Aéronefs télépilotes - Partie 006 : Moyens pour interrompre le vol, exigences et vérification

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**Aerospace series - Unmanned Aircraft Systems - Part 006:
Means to terminate flight, requirements, and verification**

Série aérospatiale - Aéronefs télépilotes - Partie 006 :
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vérification

Luft- und Raumfahrt - Unbemannte
Luftfahrzeugsysteme - Teil 006: Verfahren zum
Flugabbruch, Anforderungen und Verifizierung

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EN 4709-006:2026 (E)**European foreword**

This document (EN 4709-006:2026) has been prepared by CEN/TC 471 “Unmanned aircraft systems”, the secretariat of which is held by BNAE.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2027, and conflicting national standards shall be withdrawn at the latest by April 2027.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

1 Scope

This document specifies technical requirements and verification methods to support compliance with Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems.

This part provides requirements, test methods and pass criteria for the means to terminate flight (flight termination) for unmanned aircraft systems, in particular addressing:

- safety related aspects of the architecture;
- descent performance; and
- manufacturer's instructions.

Even if security, including IT security, can be useful from an operational point of view, it falls outside the scope of this document.

An activation of the means to terminate the flight by a visual observer is also outside the scope of this document.

This document provides voluntary means of demonstrating compliance with the requirements laid out in Regulation (EU) 2019/945.

Additional hazards that occur from the characteristics of the payload are excluded and are, instead, under the responsibility of the UAS manufacturer and UAS operator.

Tests in 4.1.2.3 are aligned with EN 4709-005:2026, 5.4.2.3, 5.4.2.4 and 5.4.2.5, same identification, with modifications.

Subclause 4.10 is aligned with EN 4709-005:2026, 5.2 as far as pertaining to the Operational Volume. See the note in 4.4.2 and C.2.

This document provides on informative basis in the Annex D, the means of demonstrating equipment to reduce the effects of impacts on ground.

This document can be applied to other UAS; Annex E provides guidance for this.

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.

EN 4709-001:2026, *Aerospace series — Unmanned Aircraft Systems — Part 001: Product requirements and verification*

EN 4709-005:2026, *Aerospace series — Unmanned Aircraft Systems — Part 005: Verification method for the Geocaging function*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

automatic flight control and guidance system

aggregation of items where the automatic flight control and guidance functions are allocated to

Note 1 to entry: The automatic flight control and guidance system includes all sensors and actuators required to perform its functions.

Note 2 to entry: For the assessment of independence and reliability, the automatic flight control and guidance system includes associated power supplies and protections.

3.2

configuration

basic design arrangement of the UA: fixed-wing, rotary wing, or multicopter

3.3

debris area

critical area from inert (non-explosive) debris defined as the sum of all areas on the ground where a person standing would be expected to be impacted by the UA during or after a loss of control event, and thus the area where a fatality is expected to occur if a person were within it

3.4

distance travelled

distance travelled by the UA after triggering the means to terminate flight measured from the point of triggering projected on the ground to the point of impact on the ground plus the largest extent of the debris area measured from the point of impact

3.5

equipment to control unmanned aircraft remotely

instrument, equipment, mechanism, apparatus, appurtenance, software, or accessory that is necessary for the safe operation of a UA, other than a part, and which is not carried on board that UA

[SOURCE: Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, Article 3, No. (2)]

3.6

failure recognition time

time for the flight termination function to detect the issue

3.7**reaction time**

time required to act

Note 1 to entry: For manual flight termination, pilot reaction time includes the time for the remote pilot to detect the issue and to take appropriate action.

Note 2 to entry: Typically, failure recognition time and pilot reaction time together are 3 s.

3.8**flight termination function**

emergency function triggered by the pilot or automatically to terminate the UA flight in a way that the UA is maintained within the ground risk buffer if triggered when the UA breaches the Operational Volume

3.9**hazard**

condition or object with the potential to cause injuries, damage, loss of material or a reduction of the ability to perform a prescribed function

3.10**independence**

concept that minimizes the likelihood of common mode errors and cascade failures between aircraft/system functions or items

Note 1 to entry: In the context of this document – relates to the means to terminate the flight: a characteristic of the UAS architecture implemented such that there is no failure in common between the automatic flight control and guidance system, the geocaging system and the flight termination system such that, if this failure occurs, control over the UA and/or its trajectory could be lost, while at the same time and because of the same failure, the flight termination system may not work.

3.11**major impact damage**

damage resulting from impact dynamics that cannot be repaired and requires the replacement of the UA

3.12**maximum operational distance**

in the context of this document, the maximum range permitted by the standard scenario for which compliance is declared to, or the maximum range declared by the manufacturer, whichever is less

3.13**means for the remote pilot to terminate the flight of the UA****means to terminate the flight****flight termination system****FTS**

technical means as part of a UAS that provide a flight termination function

3.14**Operational Volume****OV**

volume of airspace, defined in space and time, to which the operation of the UA is restricted

EN 4709-006:2026 (E)**3.15****payload**

means instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communications equipment, that is installed in or attached to the aircraft and is not used or intended to be used in operating or controlling an aircraft in flight, and is not part of an airframe, engine, or propeller

[SOURCE: Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, Article 3, No. (29)]

3.16**predictability**

assurance that the UAS performs the procedures as described in the manufacturer's instructions

3.17**reliability**

probability of proper execution of flight termination

Note 1 to entry: Relates to safe operation and does not take spurious/inadvertent activation into account.

3.18**remote pilot**

natural person responsible for safely conducting the flight of a UA by operating its flight controls, either manually or, when the UA flies automatically, by programming and monitoring its course, and remaining able to intervene and change its course at any time

[SOURCE: Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, Article 3, No. (27), modified]

3.19**unmanned aircraft****UA**

aircraft operating or designed to operate autonomously or to be piloted remotely without a pilot on board

[SOURCE: Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, Article 3, No. (1)]

3.20**unmanned aircraft system****UAS**

unmanned aircraft and the equipment to control it remotely

[SOURCE: Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, Article 3, No. (3)]

3.21**tether**

mechanical device for the purpose of effectively restraining the UA within the range permitted by the length of the tether as its primary function

3.22

tethered UA

UA that is mechanically restrained in its movement by a tether

Note 1 to entry: Not all cables linking the UA to the ground are considered as tether in the sense of this document e.g. an electric cable powering the UA, even if it was the only source of power and a loss of connection would inevitably lead to a loss of flight is not considered as a tether. Nonetheless, a tether may be used to transmit electrical power to the UA as its secondary function.

4 Product requirements and compliance of means to terminate the flight

4.1 Reliability

4.1.1 Performance requirements

Unless the UA is tethered, the UAS shall provide means for the remote pilot to terminate the flight of the UA, which shall:

- (1) demonstrate that the flight termination function terminates the flight with acceptable reliability.
 - a. Termination shall be activated by any one of the following:
 - i. automatically only;
 - ii. both manually and automatically;
 - iii. manually only.
 - b. Where termination is activated automatically: demonstrate that the termination occurs automatically once breaching the limits of the Operational Volume.

4.1.2 Verification method

4.1.2.1 General

Reliability shall be shown by application of both methods provided in the following subclauses:

- verify by ground tests according to 4.1.2.2 that the flight termination system as installed on the UAS can be activated properly and that the ability of the UA to continue powered horizontal displacement is inhibited;
- verify by flight tests according to 4.1.2.3 that the flight termination system is able to reliably perform flight termination.

In order to ensure that adequate conclusions are drawn from a test when a geocaging function is implemented on the UA (in particular for class C6 Unmanned aircraft system), it is necessary to ensure that the activation of the flight termination function will not be triggered by the geocaging function during the test. This can be achieved by programming adequately the geocaging limits to avoid the triggering of the flight termination function by the geocaging function during the test.

EN 4709-006:2026 (E)**4.1.2.2 Ground tests**

Ground tests serve as to demonstrate the ability to activate the flight termination function and the assurance of correct indications thereof as opposed to flight tests that demonstrate the performance of the flight termination function to inhibit the continuation of flight.

Ground tests shall be conducted with the UAS using the equipment to activate and execute flight termination as foreseen by the manufacturer, without the modifications to arrange a non-destructive configuration indicated as possible for flight tests.

Ground tests can be conducted with the UAS used for flight tests according to 4.1.2.3.

The test specimen shall be instrumented as required to show the characteristics of the system indicating successful execution of flight termination.

Where activated manually, the ground tests shall be performed at the maximum operational distance of the UA from the antenna(s) transmitting the flight termination command. The ground segment of the flight termination system should be connected to its antenna(s) as in the real operational case. Alternatively, in order to emulate the effects of distance, attenuation device(s) or a shielded environment equivalent to conditions whilst operating at maximum operational distance can be used.

Where activated automatically, correct activation of the termination signal shall be tested providing as input to the flight termination system those termination conditions which would cause its triggering in flight. This can be accomplished by mounting the UA on a movable platform and move the UA on the ground towards and beyond the limits of the Operational Volume. Before testing, the Operational Volume shall be defined such that:

- if the manufacturer's instructions allow to define circles, then at least one test shall be conducted with the Operational Volume defined as a circle;
- if the manufacturer's instructions allow to define polygons, then at least one test shall be conducted with the Operational Volume defined as a polygon with the minimum number of vertices, and with the maximum number of vertices;
- if the manufacturer's instructions allow to define concave shaped polygons, then at least one test shall be conducted with the Operational Volume defined as a concave shaped polygon with the sharpest concave angle using segments much longer than the UA size.

10 activations shall be performed consecutively.

Where the flight termination function can be activated both manually and automatically, 5 activations shall be manual and 5 shall be automatic.

A single ground test is considered passed when upon activation the characteristics of the system indicate successful execution of flight termination:

- a. for any configuration that performs flight termination in conjunction with deploying a parachute: the electrical current (amperage) of all motors is zero (off) and the parachute deployed; the opening of a parachute bay door is sufficient to indicate the successful deployment of a parachute where the parachute itself is deployed into the airstream;
- b. for any configuration that performs flight termination by shutting off all motors: the electrical current (amperage) of all motors is zero (off) or negative (recuperating);