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Entwurf

**Luft- und Raumfahrt –
Unmanned Aircraft Systems –
Produktanforderungen und Verifizierung für die Open Category;
Englische Fassung prEN 4709-001:2019**

Aerospace series –
Unmanned Aircraft Systems –
Product requirements and verification for the Open category;
English version prEN 4709-001:2019

Série aérospatiale –
Aéronefs télé-pilotés –
Exigences produit et vérification pour la catégorie Open;
Version anglaise prEN 4709-001:2019

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Dieser Norm-Entwurf mit Erscheinungsdatum 2019-02-15 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

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Gesamtumfang 49 Seiten

DIN-Normenausschuss Luft- und Raumfahrt (NL)

Nationales Vorwort

Der Verband der Europäischen Luft-, Raumfahrt- und Verteidigungsindustrie – Normung (ASD-STAN) ist vom Europäischen Komitee für Normung (CEN) für zuständig erklärt worden, Europäische Normen (EN) für das Gebiet der Luft- und Raumfahrt auszuarbeiten. Durch die Vereinbarung vom 3. Oktober 1986 wurde ASD Assoziierte Organisation (ASB) des CEN.

Das vorliegende Dokument (prEN 4709-001:2019) wurde von ASD-STAN, Fachbereich „Autonomes Fliegen“, unter Mitwirkung deutscher Experten des DIN-Normenausschusses Luft- und Raumfahrt (NL) erarbeitet.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 131-01-02 AA „Technische Systeme“ im DIN-Normenausschuss Luft- und Raumfahrt (NL).

Der vorliegende Norm-Entwurf enthält zur technischen Kommentierung einen Europäischen Norm-Entwurf (prEN) ausschließlich in Englischer Fassung aus der parallelen Umfrage von ASD-STAN und CEN.

Ein zweiter Norm-Entwurf wird nur die Deutsche Fassung der veröffentlichten ASD-STAN prEN enthalten. Es wird darauf hingewiesen, dass auf Grund der Verfahrensweise zur Normenerstellung bei ASD-STAN der zweite Norm-Entwurf ausschließlich der redaktionellen Prüfung der deutschen Sprachfassung dienen wird.

Entsprechend Beschluss 57/9 des Technischen Ausschusses des Beirats des DIN-Normenausschusses Luft- und Raumfahrt (NL) sind die europäischen Luft- und Raumfahrt-Normungsergebnisse zweisprachig, in Deutsch und Englisch, in das Deutsche Normenwerk zu überführen. Aus diesem Grund wird die Norm beide Sprachfassungen enthalten.

English Version

Aerospace series - Unmanned Aircraft Systems - Product requirements and verification for the Open category

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 4709-001:2019) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

This document was originally reviewed by the Domain Technical Coordinator of ASD-STAN's Autonomous flying Domain.

Introduction

EASA published on February 6, 2018 the Opinion No 01/2018 “Introduction of a regulatory framework for the operation of unmanned aircraft systems in the ‘open’ and ‘specific’ categories”.

Many organizations are involved in developing a range of general technical standards for electrical safety, EMC, environmental and also a range of other standards to be applied to specific applications. For UAS the picture is complex but an acceptable means of compliance can be completed with existing technical standards and the use of electrical components that are intended to be incorporated into equipment and for which a risk assessment can be undertaken.

This European Standard gives all Economic Operators (such as manufacturers, importers and distributors and their trade associations as well as bodies involved in the conformity assessment procedures) a viable way to prove compliance with the requirements laid out in the Opinion No 01/2018 and find commonality in compliance methods.

It is the manufacturer’s responsibility to determine, based on his risk assessment, whether the risk is acceptable. With regard to what is an acceptable level of risk for a product, this is determined by the compliance with the safety objectives defined in Opinion No 01/2018.

The end user of this document assumes all responsibility for the safe application of these test methods. All relevant safety/quality procedures should be taken into account. Special consideration should be considered when operating the UAS for evaluations. All local, state, federal, and country laws should be taken into account when operating UAS.

For repeatability, it is assumed that environmental conditions (temperature, wind, pressure, humidity) are recorded during any tests and it is further assumed tests conducted unless otherwise noted within the following conditions: Temperature – 18-28 C, Pressure – Atmospheric from sea level up to 2 000 m, Humidity – 10-60 %, Wind Speed – Calm (less than 0,3 m/s or zero on the Beaufort Scale).

1 Scope

This document provides means of compliance with Parts 1 to 6 of Commission delegated (EU) .../... of XXX on making available on the market of unmanned aircraft intended for use in the ‘open’ category and on third-country UAS operators proposed in the Opinion 01/2018.

This includes compliance with product requirements for all UAS authorized to operate in the ‘open’ category (class C0, C1, C2, C3 and C4 UAS) and the electronic identification system.

This document does not cover “Specific” or “Certified” category of UAS.

Compliance with this document assists in complying with CE marking technical requirements and covers, but is not limited to:

- I. Physical and mechanical properties;
- II. Flammability;
- III. Electrical properties;
- IV. Functional Safety.

This European Standard is only applicable for UA with energy sources based on electro-chemical technologies.

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

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 71-1:2014+A1:2018, *Safety of toys — Part 1: Mechanical and physical properties*

EN 55032, *Electromagnetic compatibility of multimedia equipment — Emission Requirements (CISPR 32)*

EN 60825-1, *Safety of laser products — Part 1: Equipment classification and requirements (IEC 60825-1)*

EN 61959, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Mechanical tests for sealed portable secondary cells and batteries (IEC 61959)*

EN 62133-1, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications — Part 1: Nickel systems (IEC 62133-1)*

EN 62133-2, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications — Part 2: Lithium systems (IEC 62133-2)*

EN 62368-1:2014, *Audio/video, information and communication technology equipment — Part 1: Safety requirements (IEC 62368-1:2014, modified)*

ETSI EN 300 328, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band*

modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

ETSI EN 301 893, Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

EN ISO 3744, Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744)

EN ISO 3746, Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746)

IEC 62471, Photobiological safety of lamps and lamp systems

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

Abbreviated Injury Scale

AIS

anatomically based coding system created by the Association for the Advancement of Automotive Medicine to classify and describe the severity of injuries

3.2

automatic flight

flight following preprogrammed instructions, loaded in the unmanned aircraft (UA) flight control system that the UA executes

3.3

Open category

category of UAS operation that, considering the low risk involved, requires neither a prior authorization by the competent authority nor a declaration by the UAS operator before the operation takes place

3.4

specific category

category of UAS operation that, considering the risks involved, requires an authorization by the competent authority before the operation takes place and takes into account the mitigation measures identified in an operational risk assessment, except for certain standard scenarios where a declaration by the operator is sufficient

3.5

certified category

category of UAS operation that, considering the risks involved, requires the certification of the UA, a licensed remote pilot and an operator approved by the competent authority, in order to ensure an appropriate level of safety

3.6

competent authority

authority responsible for the certification, authorization and oversight of UAS air operations in the Member State where the UAS operator has its principal place of business or place of residence

3.7

direct remote electronic identification

system that broadcasts the identity of the UA so that it can be directly received by existing mobile devices within the broadcasting range

3.8

follow-me mode

mode of operation of a UAS where the UA constantly follows a person or a device within a predetermined radius

3.9

geo-awareness

function that can detect a potential breach of airspace limitations and provide the remote pilot with sufficient information and an appropriate alert to allow the remote pilot to take effective action to prevent that breach

3.10

hazard

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

3.11

Maximum Take-Off Mass

MTOM

maximum take-off mass of the UA, including payload

3.12

unmanned aircraft system operator

legal or natural person who operates or intends to operate one or more UAS

3.13

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 monitoring its course and remaining able to intervene and change its course at any time

3.14

return home

fail safe system that upon loss of data link will direct the UA back to predefined home position

3.15

Remote Pilot Station

RPS

component of the UAS containing the equipment used to control the UA

3.16

standard scenario

description of a type of operation included in a certification specification issued by EASA, for which a specific operations risk assessment (SORA) has been conducted

3.17

Unmanned Aircraft

UA

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

3.18

Unmanned Aircraft System

UAS

Unmanned Aircraft and its associated elements which are operated with no pilot on board

Note 1 to entry: ISO/CD 21384-2.

3.19

Visual Line Of Sight

VLOS

type of operation in which the remote pilot maintains continuous unobstructed and unaided visual contact with the UA, allowing the remote pilot to monitor the flight path of the UA in relation to other aircraft, persons, and obstacles, for the purpose of maintaining separation from them and avoiding collisions

3.20

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

3.21

payload

additional load (cargo or equipment) a vehicle carries that is not required to operate the UA

3.22

operating empty mass

basic weight of an UA, including all equipment necessary to operate the UA (excluding payload)

4 Product Requirements and Compliance for Class 0 UAS

4.1 MTOM

The UAS shall have a maximum take-off mass of 250 g (9 oz).

Compliance is checked by verifying the mass of the airframe, configured with all available options (or the heaviest combination), is 250 g or less.

Details for payloads are given in 9.4.

4.2 Manufacturer's Instructions on Safe Flight

4.2.1 General

The Manufacturer's instructions on Safe Flight shall include the following items:

- user and maintenance manuals (4.2.2) Appendix 1.2 and 1.4;
- an aviation regulation awareness leaflet (4.2.3) Appendix 1.5.

4.2.2 User and maintenance manuals (include instructions and warnings)

Each UAS shall be placed on the market with at least the following information:

- a) the characteristics of the UA including but not limited to the:
 - UA class;
 - UA mass (with a description of the reference configuration) and the maximum take-off mass (MTOM);
 - general characteristics of allowed payloads in terms of mass dimensions, interfaces with the UA and other possible restrictions;
 - equipment and software to control the UA remotely;
 - and a description of the behaviour of the UA in case of a loss of data link.
- b) clear operational instructions;
- c) operational limitations (including but not limited to meteorological conditions and day/night operations) and;
- d) appropriate description of all the risks related to UAS operations adapted for the age of the user.

Manufacturer's information and warnings shall be drafted according to EN 62368-1:2014, F.4 and Clause 5.

4.2.3 Aviation regulation awareness leaflet

Aviation Regulation Information shall be provided on a leaflet by the manufacturer regarding use the UAS in accordance with the applicable regulations on aviation safety, security, privacy and data protection, liability and insurance.

Compliance is checked by inspection of the awareness leaflet provided by the manufacturer against the UAS Class C0 Awareness Leaflet related to the regulation on making available on the market of unmanned aircraft intended for use in the 'open' category and on third-country UAS operators.

4.3 Follow-Me Mode

4.3.1 General

If provided with a Follow-Me mode, compliance is checked by conducting the test of Subclauses 4.3.2 and 4.3.3 under the following test conditions:

- power UAS and confirm proper function per manufacturer instructions;

- system should be fully charged and configured with all available options, or not, whichever is worst case. Confirm test area is free of potential obstacles and safety hazards;
- flight stabilization options should be set to default/ manufacturer's recommendations. GPS, if any, should be turned off;
- tests require two technicians/engineers. The qualified pilot is responsible for flight during test. The second person is responsible for measurements and to be a spotter;
- pilot the UA to a stable hover with a minimum height of 2 (two) meters, activate the follow-me mode system and conduct the following tests.

4.3.2 Distance measurements

Verify that as the remote pilot moves away from the stable UA at a rate within the limits defined by the manufacturer, the UA will keep a distance not exceeding 50 m from the pilot. The UA shall also not follow at a distance less than the minimum distance defined by the manufacturer. Three (three) different tests shall be made with the remote pilot moving in different patterns.

4.3.3 Regaining control

Verify that the remote pilot is able to regain control of the UA by cancelling follow-me mode or by activating an emergency safe landing procedure that terminates the flight.

4.4 UA Label

The UA shall bear the following label in a visible manner:

Compliance is checked by observation and label permanency per EN 62368-1:2014, F.3.9.

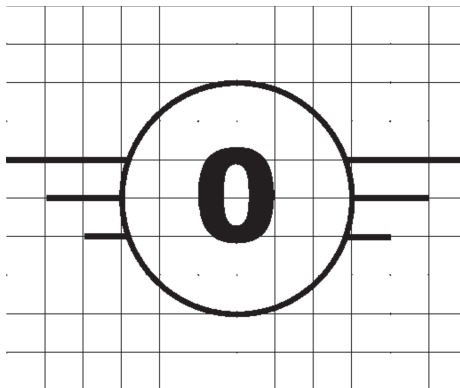


Figure 1 — Label UA C0 modified

4.5 Product requirements

4.5.1 General

The Class C0 UAS shall meet the following product safety requirements.

NOTE Class C0 UAS can also be designed in support of the requirements of the Directive 2009/48/EC on the safety of toys.