



Standard Specification for Design of the Command and Control System for Small Unmanned Aircraft Systems (sUAS)¹

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1. Scope

1.1 This specification is provided as a consensus standard in support of an application to a nation's governing aviation authority (GAA) for a permit to operate a small unmanned aircraft system (sUAS) for commercial or public use purposes.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

F2910 Specification for Design, Construction, and Test of a Small Unmanned Aircraft System (sUAS)

F2911 Practice for Production Acceptance of a Small Unmanned Aircraft System (sUAS)

F3003 Specification for Quality Assurance of a Small Unmanned Aircraft System (sUAS)

2.2 EN Standard:³

EN 62262 Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

2.3 IEC Standard:³

IEC 60529 Degrees of protection provided by enclosures (IP Code)

3. Terminology

3.1 Definitions:

3.1.1 *bit error rate detection, BER, n*—rate at which errors occur in a transmission system; applicable to any system that transmits data over a network of some form in which noise, interference, and phase jitter may cause degradation of the digital signal.

3.1.2 *command and control (C2) link(s), n*—safety-critical radio-frequency (RF) link(s) between the ground control station (GCS) and the unmanned aircraft (UA).

3.1.3 *C2 range, n*—distance between GCS and UA at which positive control of the UA can be maintained.

3.1.4 *downlink, n*—any RF link from UA to GCS.

3.1.5 *flight control system, FCS, n*—composed of system components intended to take GCS commands via a C2 link and control flight control surfaces and propulsion systems.

3.1.5.1 *Discussion*—The FCS may include autopilot functions, lost-link functions, fly-away protection functions, payload functions, and navigation functions. The FCS may be contained in one discrete component or multiple discrete components.

3.1.6 *fly away, n*—unintended flight outside of operational boundaries (altitude/airspeed/lateral) as the result of a failure of the control element or onboard systems, or both.

3.1.7 *fly-away protection system, n*—a system that will return the UA safely to the surface, or keep the UA within the intended operational area, when the C2 link between the pilot and the UA is lost.

3.1.8 *ground control station, GCS, n*—a land- or sea-based control center that provides the facilities for human control of UA.

3.1.9 *licensed band, n*—any frequency or range of frequencies in which transmission requires permission from a governing body (for example, the Federal Communications Commission [FCC]).

3.1.10 *link error, n*—degradation of the digital signal between the GCS and the UA that can be monitored by techniques including BER detection.

3.1.11 *link integrity, n*—acceptable rate of transactions completed with undetected error.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.