Designation: F 2635 – 07

Standard Classification for Unmanned Aircraft Pilot Certification[1]

This standard is issued under the fixed designation F 2635; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This classification covers a set of definitions and categorization for the certification and licensing of Unmanned Aircraft (UA) pilots. It is designed for use by both industry and regulatory authorities applicable to UA across the entire size, weight and performance continuum. In creating this classification, contributors were guided by the following principles:

1.1.1 Parallel existing regulations for manned aircraft to the maximum extent practical.

1.1.2 Similar words in other standards or regulations shall have similar meaning herein (e.g., 14 CFR Part 61 and FAA Notice 07-01, and Australia's CASR Part 101).

1.1.3 Avoid burdening regulatory agencies and users with an overabundance of new terms and definitions. Where new terms are required, their meanings shall strive to be self-evident.

1.1.4 Although targeted primarily at commercial and private users, the standard should anticipate adoption by military and government users.

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]

F 2395 Terminology for Unmanned Aircraft Systems

2.2 *Federal Standards:* [3]

14 CFR Part 61 Certification: Pilots, Flight Instructors, and Ground Instructors

FAA Notice 07-01 Unmanned Aircraft Operations in the National Airspace System, Docket No. FAA-2006-25714

2.3 *Australian Government Documents:* [4]

CASR Part 101 Unmanned Aircraft and Rocket Operations

3. Terminology

3.1 *Definitions:*

3.2 *category*, *n*—method of grouping aircraft by distinguishing their primary lift characteristic (for example, airplane, rotorcraft, lighter-than-air, etc.).

3.3 *certificate*, *n*—document that authorizes an individual to pilot a UA.

3.3.1 *Discussion*—For the purposes of this standard, a certificate is interchangeable with the term license.

3.4 *class*, *n*—method of grouping similar designs of aircraft within a particular category.

3.5 *commercial use*, *n*—operation of an unmanned aircraft for compensation or hire.

3.6 *license*, *n*—document that authorizes an individual to pilot a UA.

3.6.1 *Discussion*—For the purposes of this standard, a license is interchangeable with the term certificate.

3.7 *limitation*, *n*—restriction used to prevent a pilot from performing maneuvers or actions to which he/she has not been properly trained and certified to perform.

3.8 *operator*, *n*—organization, commercial entity, or individual that owns, leases, schedules, or maintains, or a combination thereof, an unmanned aircraft.

3.9 *pilot at the controls (PAC)*, *n*—person directly responsible for controlling the unmanned aircraft (UA) at the current time.

3.10 *pilot in command (PIC)*, *n*—as stated in various international aviation regulations, the person in control of and responsible for the UAS.

3.10.1 *Discussion*—This is often the PAC. However, for a UAS that has multiple controls, one person shall be designated as the PIC irrespective of who is currently the PAC. As an analogy, the "captain" of a multi-place manned aircraft retains the role of PIC even when the co-pilot or first officer is the PAC.

3.11 *rating*, *n*—additional classification of maneuvers and procedures that a pilot is authorized to perform (for example, instrument rating).

[1] This classification is under the jurisdiction of ASTM Committee F38 on Unmanned Aircraft Systems and is the direct responsibility of Subcommittee F38.03 on Personnel Training, Qualification and Certification.

Current edition approved April 15, 2007. Published June 2007.

[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 U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

[4] Available from Australian Government Civil Aviation Safety Authority, GPO Box 2005, Canberra ACT 2601, http://www.casa.gov.au.

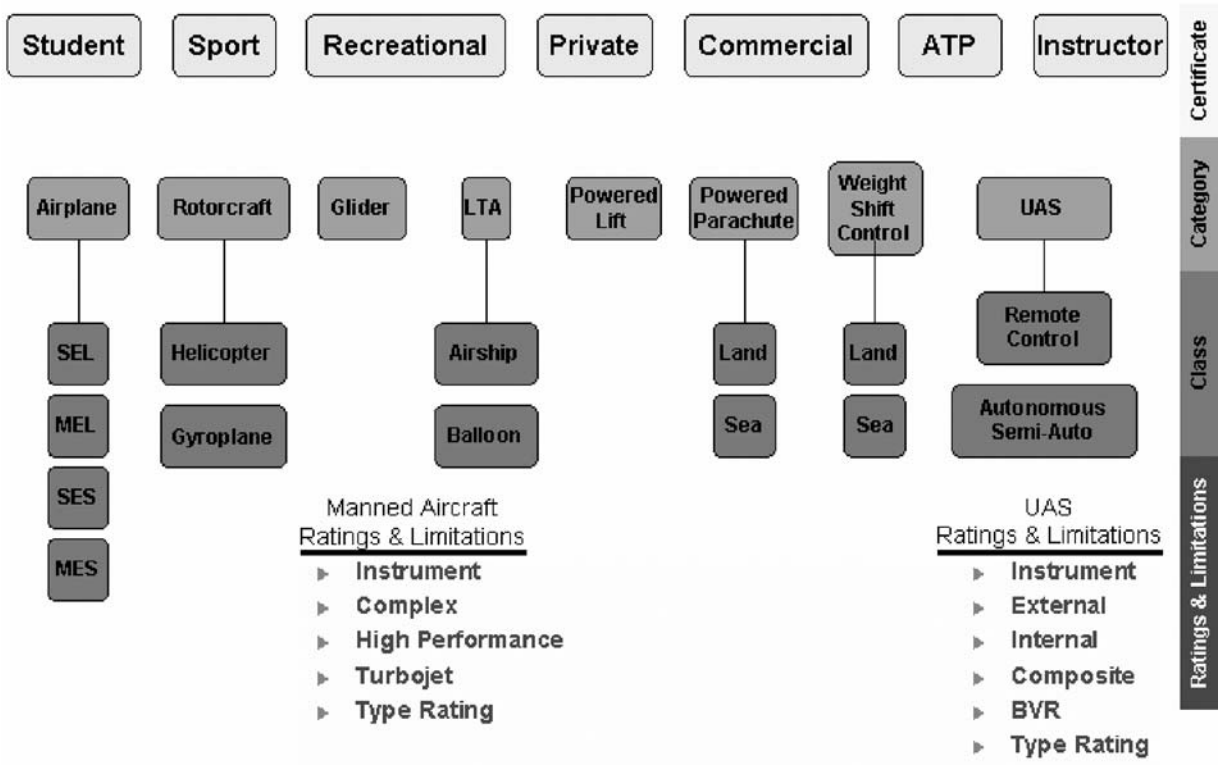

FIG. 1 UAS Pilot Certificate Taxonomy

3.12 *unmanned aircraft (UA)*, *n*—the airborne component of a UAS (see Terminology F 2395).

3.13 *waiver*, *n*—granted use or acceptance of an article that does not meet the specified requirement.

4. Significance and Use

4.1 The specific use of the word "pilot" in this standard is meant to convey an equivalent level of professionalism and certification rigor as is applied to the manned aviation community. It is not meant to suggest that a UA pilot must be a qualified crewmember of a manned aircraft. The term was purposefully selected to help overcome some of the barriers to entry into national airspace.

4.2 There is also an assumption that national regulatory agencies will allow a spectrum of formality for the licensing and certification of UA pilots in a manner similar to that of manned aviation. For example, a pilot "certificate" or "license" issued by a national regulatory authority is required to fly a single engine airplane over a certain weight whereas an industry "license" or merely manufacturer's training is the only requirement to fly a hang-glider or ultra-light. It is therefore expected that the process to license a pilot for a particular UA will be commensurate with the size, weight, performance or other defined characteristic of that UA. This standard does not recommend a particular level of formality for any given UA.

5. Basis of Classification

5.1 *License*—Existing pilot licenses fall into the following groups: Student, Sport, Recreational, Private, Commercial, Airline Transport Pilot and Instructor. This standard does not add any additional license grouping.

5.2 *Category*—Pilot licenses are further defined by the category of aircraft they are authorized to fly (for example, airplane, rotorcraft, glider, lighter-than-air, etc.). This standard adds "Unmanned Aircraft" category to this list.

5.3 *Class*—Within each category, pilot licenses are further defined by the class of aircraft unique to that category (for example, single-engine or multi-engine airplane, helicopter or gyrocopter rotorcraft, etc.). This standard adds the following two classes to the UA category:

5.3.1 *Remote Control (RC)*—Class of UA that allows the pilot to remotely manipulate the flight control surfaces through the use of a joystick or other control system whose deflection is directly translated into a flight control position. The use of an autopilot for stability augmentation does not violate the RC designation. Examples of RC class aircraft include General Atomics' Predator and Israeli Aircraft Systems' Pioneer.

5.3.2 *Semi-Autonomous (SA)*—Class of UA where the pilot interfaces through a flight management system (see Terminology F 2395 for a complete definition). Unlike the RC mode, where the primary user interface is a joystick or other mechanical controller, the man-machine interface for an SA UA is typically a keyboard, touchscreen, or mouse. Examples of SA class aircraft include Northrop Grumman's Global Hawk and AAI's Shadow.

5.3.3 Fig. 1 depicts the standard as it relates to the existing U.S. FAA system.

5.4 *Ratings and Limitations*—Due to the variety of system designs and methods of operation, the following ratings and limitations have been identified for their applicability to individual certificates:

TABLE 1 Practical Examples of Certificate Taxonomy for Current Systems[A]

UAS	Certificate	Category	Class	Ratings and Limitations	Type Rating
Aero Vironment Raven	N/A (Industry License)	N/A	N/A	N/A	N/A
Model aircraft used for commercial photography	Commercial	UAS	RC	N/A	N/A
Yamaha RMAX	Private or Commercial	UAS	RC	External	N/A
AAI Pioneer	Commercial	UAS	RC	Internal External Composite BVR	N/A
AAI Shadow	Commercial	UAS	SA	Internal BVR	N/A
Elbit Systems Ltd. Hermes	Commercial	UAS	RC SA	External (RC) Internal (Auto) BVR	N/A
General Atomics (Family)	Commercial	UAS	RC	Internal Instrument BVR	MQ-1 MQ-9 Altair
Northrop Grumman Firescout	Commercial	UAS	SA	Internal BVR	N/A
Northrop Grumman Global Hawk	Commercial	UAS	Auto	Internal Instrument BVR	RQ-4

[A] This table is meant to convey a sample of the most likely possible combinations for some systems. The examples in this table are not meant to be limiting or otherwise deterministic. For example, although it might be possible for an individual to pilot a privately owned Shadow UAS using a Private certificate, it was considered a low probability and therefore not included in this table.

5.4.1 *Instrument*—For a pilot who intends to fly a UA under instrument flight rules (IFR), the pilot shall have obtained an applicable instrument rating. Requirements to obtain an instrument rating for a UAS shall be established by appropriate regulatory authorities and may or may not necessarily include the requirement to demonstrate instrument flying in a manned aircraft.

5.4.2 *External*—This rating applies to a pilot who remotely controls (RC) the UA by maintaining an "external" visual reference to the aircraft at all times during the flight.

5.4.3 *Internal*—A UAS pilot who either remotely or autonomously controls/monitors the UA flight from a control station or solely by means of instruments and displays.

5.4.4 *Composite*—This rating applies to either Internal or External pilots who operate a system that requires both Internal and External pilots. Composite rated pilot receive additional training in crew coordination and the unique requirements to conduct control handoffs between the external and internal pilot during takeoff and landing evolutions.

5.4.5 *Beyond Visual Range (BVR)*—This rating applies to Internal pilots who intend to fly a UA beyond visual range of the launch environment (see Terminology F 2395 for a complete definition of visual range).

5.4.6 *Type Rating*—For large or highly complex systems, or both, a type rating may be required as specified by either the system manufacturer, control station manufacturer or regulatory authority.

5.5 *Examples*—Table 1 provides some examples of certificates, ratings and limitations for a variety of currently fielded systems as of the publication date of this document.

6. Keywords

6.1 certification; license; limitation; pilot; rating; unmanned aircraft system

Bibliography

(1) Civil Aviation Safety Authority (CASA) Australia, Advisory Circular AC 101–1(0), Unmanned Aircraft and Rockets—Unmanned Aerial Vehicle (UAV) Operations, Design Specification, Maintenance and Training of Human Resources