

EXEMPTION REQUESTS AND EQUIVALENT LEVEL OF SAFETY

Celestial Imaging requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the DJI Inspire 1:

14 CFR Part 21, Subpart H: Airworthiness Certificates

This part establishes the procedures for the issuance of an airworthiness certificate. While the FAA continues to work to develop airworthiness standards for UAS, we request an experimental certificate be issued for the DJI Inspire 1 under either or both of the following provisions:

21.191 Experimental certificates.

Experimental certificates are issued for the following purposes:

(a) *Research and development.* Testing new aircraft design concepts, new aircraft equipment, new aircraft installations, new aircraft operating techniques, or new uses for aircraft.

(b) *Showing compliance with regulations.* Conducting flight tests and other operations to show compliance with the airworthiness regulations including flights to show compliance for issuance of type and supplemental type certificates, flights to substantiate major design changes, and flights to show compliance with the function and reliability requirements of the regulations.

Since the experimental certificate can be used for commercial purposes such as market surveys, sales demonstrations, and customer crew training, we would expect that an experimental certificate would permit our commercial purpose as well.

The aircraft will not carry persons or property, will not carry fuel, and will only fly under strict operational requirements. Combined with the fact that the aircraft weighs 6.5 pounds and is constructed primarily out of plastic and carbon tubing, I propose that the DJI Inspire 1 will be at least as safe, if not safer, than a conventionally certificated aircraft performing the same missions.

If an experimental airworthiness certificate is not appropriate for this application, then we request an exemption of 14 CFR Part 21, Subpart H, and the requirement for an airworthiness certificate in general, citing the equivalent level of safety outlined in the previous paragraph.

14 CFR 91.203(a) & (b) Civil aircraft: Certifications required.

The regulation provides that an airworthiness certificate, with the registration number assigned to the aircraft and a registration certificate must be aboard the aircraft. Additionally, subparagraph (b) provides that the airworthiness certificate be "displayed at the cabin or cockpit entrance so that it is legible to passengers or crew." At 6.5 lbs., the Inspire 1 is too small to carry documentation, does not have an entrance, and is not capable of carrying passengers or crew.

To obtain an equivalent level of safety and meet the intent of 91.203, we propose that documents deemed appropriate for this aircraft by the FAA will be co-located with the crew at the ground

control station and available for inspection upon request. In order to identify the aircraft, we propose that the information found on airworthiness and registration certificates be permanently affixed to the aircraft via placard:

Manufacturer: DJI
Model: Inspire 1
Serial Number: 14-XXXX
Registered to:
Celestial Imaging LLC
8111 Main Street
Any town, ID 12345
If found please contact: (800)-555-1234.

14 CFR 45.23 Display of marks; general and 45.29 Size of marks.

These regulations provide that each aircraft must display "N" and the aircraft's registration number in letters at least 3 inches high. Additionally, the aircraft must display the word "EXPERIMENTAL" in letters at least 2 inches high near the entrance to the cabin, cockpit, or pilot station. The Inspire 1 does not have an entrance in which the word "EXPERIMENTAL" can be placed, and may not have a registration number assigned to it by the FAA.

We propose to achieve an equivalent level of safety by including the word "EXPERIMENTAL" on the top of the aircraft, where the PIC, VO and others in the vicinity of the aircraft while it is preparing for launch will be able to see the designation. Additionally, we feel that the permanent placard discussed in the previous paragraph will provide the aircraft's registration information should it be found on the ground. Finally, we will display at the ground station a high contrast flag or banner that contains the words "Unmanned Aircraft Ground Station" in letters 3 inches high or greater. Since the aircraft will operate within 1/2 NM of the ground station, the banner should be visible to anyone that observes the aircraft and chooses to investigate its point of origin.

14 CFR 91.9 Civil aircraft flight manual, marking, and placard requirements.

This regulation provides that no person may operate an aircraft unless a current, approved flight manual is in the aircraft. We assume that the intent of this requirement is to ensure that flight manual information is available to the aircrew while operating the aircraft. We request an exemption to this requirement since the aircraft is not only too small to carry documentation; the documentation would not be available to the crew.

To obtain an equivalent level of safety and meet the intent of 91.9, we propose that a current, approved Airplane Flight Manual (appendix E) must be available to the crew at the ground station anytime the aircraft is in, or preparing for, flight.

14 CFR 61.113 Private pilot privileges and limitations: Pilot in Command and 61.133 Commercial pilot privileges and limitations.

The regulation provides that no person that holds a private pilot certificate may act as pilot in command of an aircraft for compensation or hire. Subparagraph (b) allows a private pilot to act as pilot in command of an aircraft in connection with any business or employment if: (1) The flight is only incidental to that business or employment; and (2) The aircraft does not carry passengers or property for compensation or hire.

14 CFR 91.119 Minimum safe altitudes: General.

The regulation provides that over sparsely populated areas the aircraft cannot be operated closer than 500 feet to any person, vessel, vehicle, or structure. Since the aircraft will be operating at a maximum of 400 feet AGL, we cannot comply with this requirement.

To provide an equivalent level of safety we will only fly over property where we have received the permission of the land owner. The land owner will be briefed of the expected route of flight and the associated risks to persons and property on the ground. We maintain that due to the small size of the Inspire 1, the hazard to persons, vessels, vehicles, and structures is not comparable to manned aircraft and should be considered in granting the exemption. (See appendix C section 6.4.1 Consideration about risks related to ground impacts)

The aircraft will not be operated over congested areas nor over any open air assembly of persons. The aircraft will be operated at an altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

14 CFR 91.121 Altimeter settings.

The regulation provides that aircraft shall maintain cruising altitudes by reference to an altimeter setting available within 100 nautical miles of the aircraft. The aircraft will fly below 400 feet AGL and will not need to maintain hemispherical cruising altitudes in order to de-conflict with other aircraft. As such, an appropriate altimeter measurement presented to the pilot should be Above Ground Level and should be based on the barometric pressure at the point of launch. To provide an equivalent level of safety, the UAS's AGL altimeter will be set to zero on the ground prior to every flight. Since the aircraft will fly no more than 30 minutes, even rapid changes in barometric pressure will have limited effect on the safety of the flight.

14 CFR Subpart E (91.401 - 91.417) - Maintenance, Preventive Maintenance, and Alterations

The regulation provides that the operator is primarily responsible for maintaining the aircraft in an airworthy condition, including compliance with part 39 and 43. Paragraphs 91.407 and 91.409 require that the aircraft be "approved for return to service by a person authorized under 43.7" after maintenance and inspection. It is our intention that the PIC perform maintenance and inspection of the aircraft and "be authorized to approve the aircraft for return to service."

As provided in the attached Maintenance Procedures (appendix D), the PIC will ensure that the aircraft is in an airworthy condition prior to flight and conduct detailed inspections after every 5 hours. Maintenance performed by the PIC is limited to repairing small cracks, replacing a propeller, and updating software and firmware. All other maintenance will be performed by the manufacturer. The PIC will document work performed in accordance with 91.417. We feel that due to the size, construction, and simplicity of the aircraft, the PIC can ensure an equivalent level of safety.

8900.227 Paragraph 16(c)(4) PIC Medical and Paragraph 16(e)(1) Observer Medical.

This policy provides that both the PIC and VO must have a valid FAA second-class medical certificate issued under part 67 in order to perform as a pilot or observer. The aircraft weighs 6.5 pounds and is constructed out of plastic and carbon tubing. Requiring the crew to meet the same medical requirements as a commercial pilot carrying passengers in a large aircraft is an unnecessary burden.

We propose that the minimum medical requirements be vision corrected to 20/20 and a valid, state-issued driver's license. Due to the size and weight of the aircraft, the greatest hazard of our proposed operation will be driving to the launch site. A licensed driver is medically qualified to operate a much larger vehicle. The 20/20 vision requirement will ensure that the PIC and VO can see and avoid air traffic. Given the unlikely event that both the PIC and VO become medically incapacitated while the aircraft is in flight, the Inspire 1 will recover autonomously to the landing location designated prior to launch without crew intervention.