



U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave
Washington, DC 20591

In the matter of the petition of

AMAZON PRIME AIR

For an exemption from §§ 61.23;
61.133, 91.113(b) through (f);
91.119(b) and (c); 91.121;
91.151(a); 135.25(a)(1) and (a)(2);
135.63(c) and (d); 135.65(d);
135.93; 135.149(a); 135.161(a)(1)
through (3); 135.203(a);
135.209(a)(1); 135.243(b)(1)
through (3); 135.415(b); and
135.501(a) of Title 14, Code of
Federal Regulations

Exemption No. **18602**
Regulatory Docket No. **FAA-2019-0622**

GRANT OF EXEMPTION

By letter dated July 16, 2019, Mr. Sean Cassidy, Director, Safety & Regulatory, Amazon¹ (hereinafter referred to as “Amazon”), 440 Terry Avenue N, Seattle, Washington 98109, petitioned the Federal Aviation Administration (FAA) for an exemption from §§ 61.23; 61.133, 91.113(b) through (f); 91.119(b) and (c); 91.121; 91.151(a); 135.25(a)(1) and (a)(2); 135.63(c) and (d); 135.65(d); 135.93; 135.149(a); 135.161(a)(1) through (3); 135.203(a); 135.209(a)(1); 135.243(b)(1) through (3); 135.415(b); and 135.501(a) of Title 14, Code of Federal Regulations (14 CFR). This exemption (the 44807 exemption) addresses the statutory requirement that a civil aircraft in air commerce operate with an airworthiness certificate and provides relief from the requirements of §§ 91.7(a)² and 135.25(a)(1) and (a)(2) that an aircraft conducting operations be in an airworthy condition and hold an appropriate airworthiness certificate for part 135 operations, respectively. With the exception of Amazon’s request for relief from § 135.25(a)(1) and (a)(2), the FAA will dispose of Amazon’s request for relief from the remaining regulatory sections in a companion exemption (the operating exemption). The FAA further notes that Amazon is

¹ Amazon.com Services, LLC (dba Amazon Prime Air).

² Amazon did not request relief from § 91.7(a); however, the FAA has determined that relief is necessary.

simultaneously working with the FAA to receive its part 119 air carrier certificate for part 135 operations.

To analyze Amazon's requests for regulatory relief, the FAA requested information related to the exemption and to its air carrier certification document submittal for further review. Amazon responded with supporting documentation, which it has marked proprietary. The FAA has identified the supporting documents that Amazon submitted and the FAA considered in its analysis for issuance of this exemption. The FAA titled the list of supporting documents as "Amazon 44807 Exemption No. 18602: Supplemental Documents Considered" and posted this list to the docket.

This exemption is issued under the authority of 49 U.S.C. 44807 for two purposes. First, it addresses the statutory requirement that a civil aircraft in air commerce operate with an airworthiness certificate.³ Second, this exemption provides relief from the requirement of § 135.25(a)(1) and (a)(2) that an aircraft conducting operations in accordance with part 135 hold an appropriate airworthiness certificate.⁴

The relief provided in this 44807 exemption would enable the Amazon MK27 unmanned aircraft (MK27 UA) and associated aircraft systems (MK27 UAS) to operate in cargo delivery operations without an airworthiness certificate. The FAA concludes that Amazon's compliance with the conditions and limitations of this exemption, along with the FAA's safety evaluation of the MK27 UAS, will enable Amazon's operations using the MK27 UAS without adversely affecting safety. Amazon is currently engaged in the process to receive a type certificate for the MK27 UAS utilized in its operations. The FAA continues to work with Amazon on the aircraft certification process. The companion operating exemption includes a discussion of that process.

The FAA's analysis is as follows:

By separate action, the Secretary of Transportation (hereafter the Secretary) has exercised her authority under 49 U.S.C. 44807 and determined that the MK27 UAS, which Amazon would use for operations described in this exemption, may operate safely in the national airspace system (NAS). Title 49 U.S.C. 44807 provides the Secretary with authority to determine whether a certificate of waiver, certificate or authorization, or a certificate under §§ 44703 or 44704, is required for the operation of certain UAS. Section 44807(b) instructs the Secretary to base this determination on which types of UAS do not create a hazard to users of the NAS or the public. In making this determination, the Secretary must consider the size, weight, speed, operational capability of the UAS, and other aspects of the proposed operation. For the purposes of Amazon's part 135 operations as described in its petition for relief, the Secretary has determined that Amazon's MK27 UAS can operate safely in the NAS in the absence of an airworthiness certificate.

³ Title 49 U.S.C. 44711.

⁴ The FAA notes that the MK27 aircraft has a special airworthiness certificate in the experimental category (SAC-EC). However, the FAA has determined that for the purposes of Amazon's proposed operations, the SAC-EC that applies to the aircraft does not reach the level of safety necessary for operations under part 135. An exemption from the airworthiness requirement, in accordance with 49 U.S.C. 44807 and as described in this decision, is appropriate.

Amazon seeks to operate the MK27 UA beyond visual line of sight (BVLOS) of the pilot in command in cargo delivery operations without the appropriate airworthiness certificate that 14 CFR §§ 91.7 and 135.25 require. Amazon contends the reliability of its system achieves a level of safety equivalent to the level of safety provided under the foregoing regulations. Amazon also contends that the requested relief to conduct these operations is in the public interest.

On July 14 and 15, 2020, the FAA observed Amazon's flight operations as part of an operational suitability demonstration. Amazon's demonstration consisted of nine flights in various predetermined configurations designed to evaluate Amazon's MK27 UAS operating in normal, abnormal and emergency conditions. One of the nine flights was conducted to validate the use of the flight termination system (FTS) using the remote command function. Amazon successfully demonstrated this functionality. In addition to the observed flights, the FAA and Amazon communicated regarding the observables and system interactions to analyze and determine outcomes of each flight demonstration. Furthermore, the FAA validated the use of six distinct maintenance procedures and found the performance of those procedures using the Amazon Prime Air MK27, Unmanned Aircraft Maintenance Manual acceptable.

The conditions and limitations provided in this exemption are based on analyses performed by the FAA, as previously described. They provide aircraft-specific conditions and limitations as well as performance-based parameters to identify appropriate operating areas (e.g. for limits on operations over roadways, people, and structures) for the MK27 UA. Amazon's compliance with these conditions and limitations will sufficiently mitigate the risks of Amazon's proposed operations with the MK 27 UAS.

14 CFR Part 91

Section 91.7(a)

Section 91.7(a) provides, in pertinent part, that no person may operate a civil aircraft unless it is in an airworthy condition. While Amazon did not request relief from § 91.7(a), the FAA finds it necessary to grant Amazon relief from this regulation without an airworthiness certificate, consistent with the relief the FAA is granting from § 135.25(a)(1) and (a)(2), as discussed below.

Based on the information the FAA reviewed in analyzing the proposed operations and the Secretary's determination under 49 U.S.C. 44807, the FAA has determined that, subject to the conditions and limitations provided in this exemption, the proposed operations with the MK27 UAS would not adversely affect safety and relief can be granted to Amazon.

14 CFR Part 135

Section 135.25(a)(1) and (a)(2)

Section 135.25(a)(1) and (a)(2) provides in pertinent part that no certificate holder may operate an aircraft under part 135 unless it is registered as a civil aircraft of the United States; carries an appropriate and current airworthiness certificate; and is in an airworthy condition.

The requirement to carry an appropriate and current airworthiness certificate on aircraft conducting air carrier operations is important to ensure that those aircraft have been designed, manufactured, and maintained to the established safety standards. Compliance with this requirement also ensures pilots operating aircraft have consistent information of a sufficient quality that enables them to conduct operations safely.

This exemption permits the use of the MK27 UAS in part 135 operations without an airworthiness certificate while Amazon is actively pursuing type certification for this aircraft. Based on the analysis of the information submitted in support of this exemption and consistent with the Secretary's determination under 49 U.S.C. 44807, the FAA concludes that operations conducted in accordance with the conditions and limitations listed below ensure there is no adverse effect on safety. The conditions and limitations described herein will create an operating environment that mitigates risk until such time as Amazon can obtain an appropriate and current airworthiness certificate. In this regard, the 44807 exemption process is not intended to replace the normal aircraft type certification process. Finally, issuance of this exemption is predicated on Amazon's continued participation in the FAA type certification process for the MK27 UAS.

Discussion of Comments

The FAA published a summary of the petition in the Federal Register on August 8, 2019 (84 FR 39048). In response to the publication, the FAA received and considered 51 comments, from 35 individuals and 16 aviation-related organizations.

Experimental Aircraft Association (EAA), The Boeing Company (Boeing), National Agricultural Aviation Association (NAAA), Helicopter Association International (HAI), Association for Unmanned Vehicle Systems International (AUVSI), Coalition of Airline Pilots Associations (CAPA), Air Line Pilots Association (ALPA), and various individuals submitted comments regarding airworthiness requirements. AUVSI supported Amazon's petition for exemption for commercial package delivery under part 135 and also commented in support of Amazon's petition for exemption from Section 44807 regarding airworthiness certification requirements. EAA stated that Amazon's type certification process should be carefully monitored and upon discovery of any unsafe characteristics, the operation of the aircraft should be immediately reevaluated. HAI stated that commercial operation of a UAS of the size and capability of the MK27 UAS should have an appropriate airworthiness certificate, as is required of manned aircraft operating under part 135. NAAA stated that all UAS should be required to have an airworthiness certificate and that to be considered airworthy, a UAS must be equipped with sense and avoid technology, ADS-B Out-like

technology, and a visible strobe light, and must be coated in a highly visible colors and have a registered N-number on a plate attached to the UA.

Boeing commented that the petition does not include Amazon's proposed airworthiness criteria for the UAS. Boeing also commented that it is unclear from the petition how Amazon intends to achieve an equivalent level of safety for command and control (C2) functions, as compared to conventional aircraft operations. One individual stated that Amazon's application shows a complete disregard for the concept of airworthiness. Another commenter stated that allowing Amazon to establish a continuous airworthiness maintenance program (CAMP) derogates the intent and purpose of that program since the program is designed to ensure airworthiness of the aircraft and the UAS does not have an airworthiness certificate nor is it type certificated. CAPA commented that they were concerned with lost link and fly-aways due to unreliable video, data, and control link technology.

ALPA expressed concerns with Amazon's proposal to conduct its own internal investigations of accidents and incidents and that the petition for exemption implies the investigations would occur without government coordination. One individual recommended denying relief from § 135.65(d), concerning recording mechanical irregularities. The commenter stated that the maintenance record requirements of 14 CFR part 43 especially, apply to maintenance performed on aircraft, airframes, aircraft engines, propellers, appliances, or component parts, and that maintenance is defined in 14 CFR § 1.1 as an inspection, overhaul, repair, preservation, and the replacement of parts, but excludes preventative maintenance; however, all preventative maintenance must be recorded under § 43.9(a).

As discussed in this exemption, the FAA has performed an extensive analysis of the proposed operations. The Special Authority for Certain Unmanned Systems (49 U.S.C. 44807) grants the Secretary of Transportation the authority to use a risk-based approach to determine whether an airworthiness certificate is required for a UAS to operate safely in the NAS. The Secretary of Transportation has exercised the authority under § 44807 and has made such finding for the MK27 UAS. Consistent with the Secretary's determination and the reasons discussed in this exemption, the FAA has determined that Amazon's proposed operations can be conducted safely in the NAS, subject to the conditions and limitations of this exemption. In addition, the FAA is actively working with Amazon, as the manufacturer of this UAS, on type certification (TC) requirements for the eventual issuance of a TC upon completion of the process.⁵

Amazon's MK27 UAS will temporarily operate under the conditions and limitations of this 44807 exemption, until such exemption terminates, is superseded, or is rescinded for any reason, including the issuance of a TC. The FAA has reviewed the material submitted by Amazon and has established appropriate conditions and limitations in this exemption to reduce risk and ensure no adverse effect on safety will occur. The FAA has also limited the operations conducted with aircraft that utilize these exemptions. The FAA requires Amazon to actively continue the type certification process.

⁵ *Type Certification of Unmanned Aircraft Systems*, Notice of Policy 85 Fed. Reg. 5905 (Feb. 3, 2020).

Public Interest

As part of the FAA's efforts towards integrating unmanned aircraft into the NAS, including enabling UAS commercial package delivery operations, the FAA is gathering data through the issuance of exemptions from current regulations. With this exemption, the FAA can authorize operations that allow the FAA to obtain practical experience and data that it would not otherwise obtain. Through observing these operations, the FAA anticipates gaining significant practical experience and data regarding UAS air carrier operations. Such information will assist the FAA in understanding the risks and appropriate risk mitigation measures, which will further the FAA's policy decisions that could result in rulemaking decisions.⁶ Based on the foregoing, this grant of relief from §§ 91.7(a) and 135.25(a)(1) and (a)(2) is in the public interest.

The FAA's Decision:

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 106(f), 40113, and 44701, delegated to me by the Administrator, Amazon is granted an exemption from 14 CFR §§ 91.7(a) and 135.25(a)(1) and (a)(2) to the extent necessary to allow Amazon to conduct part 135 air carrier operations for commercial package delivery or validation flights conducted in conjunction with the FAA review of an application for a part 135 operating certificate using its MK27 UAS, subject to the conditions and limitations listed below.

Conditions and Limitations:

Failure to comply with any of the conditions and limitations of this exemption renders this entire exemption void.

1. Operations authorized by this grant of exemption are limited to the Amazon Prime Air MK27 UAS. Operations under this exemption may only be conducted in conjunction with the conditions and limitations issued in the companion operating exemption, Exemption No. 18601 or validation flights conducted in conjunction with the FAA review of an application for a part 135 operating certificate.
2. Amazon must actively work with the FAA on the application and issuance of a U.S. type certificate for the MK27 UAS.
3. Amazon must maintain and adhere to the following manuals at the revision level listed in this Condition and Limitation, or a later revision, if approved by the Administrator:
 - a. Amazon Prime Air MK27, Unmanned Aircraft Flight Manual (UFM),
Revision 0, 08/14/2020

⁶ See Section 348 of the FAA Reauthorization Act (Public Law 115-254) requiring the FAA to "update existing regulations to authorize the carriage of property by operators of small unmanned aircraft systems for compensation or hire within the United States."

- b. Amazon Prime Air MK27, Unmanned Aircraft Maintenance Manual (UMM), Revision 0, 08/14/2020
 - c. Amazon Prime Air MK27, Operator Handbook, Revision 0, 08/14/2020
 - d. Amazon Prime Air MK27, Concept of Operations, Revision 0, 08/14/2020
4. If a discrepancy exists between this exemption, any associated manual required under 14 CFR part 135, or associated Certificate of Waiver or Authorization (COA), Amazon must comply with the most restrictive provision.
 5. UAS operations may not be conducted during night, as defined in 14 CFR part 1.1, until such time as the MK27 UA is equipped with appropriate lighting.
 6. For all operations, the UA must be equipped and operated with an anti-collision light. The anti-collision light must be visible for at least 3 statute miles between the beginning of evening civil twilight and the end of morning civil twilight.
 7. The MK27 UA must not be operated higher than 400 feet above ground level (AGL).
 8. Amazon must designate a perimeter with a minimum 100 foot radius centered at the takeoff, landing and delivery points. Amazon must ensure that no person is inside the perimeter(s) during takeoff, landing and delivery.
 9. Any change to the MK27 UAS hardware and software must be approved by the FAA prior to its implementation.
 10. Amazon must maintain a configuration control document listing each major component installed in the UAS, and their associated systems (i.e. motors, propellers, servos, batteries, navigation equipment, communication equipment, software, ground control station hardware, etc.). The list must contain the part-numbers and modification levels of equipment as applicable. The list must be revised to represent the latest UAS configuration. Amazon must retain configuration control document records at least until this grant expires. The configuration control document must be provided to the FAA upon request. All MK27 UAS operated by Amazon must conform to the following configuration control document (Amazon Prime Air MK27, Configuration Document) at the revision level listed, or later revision as approved by the Administrator prior to implementation.
 11. Amazon may not operate the MK27 UA with known inoperable instruments or equipment except in accordance with a minimum equipment list (MEL) that has been prepared in accordance with 14 CFR § 135.179 and approved by the FAA. As an MEL

has not been developed for this MK27 UA, if Amazon desires to utilize a MEL, it must develop its own proposed MEL and submit it to the FAA for approval.

12. Prior to the commencement of any flight, the PIC must ensure that the pilot interface, as described in the UFM, and all UAS systems designed to warn the PIC that the MK27 UA has violated the volume of airspace surrounding the UA's flight path, are functioning properly.
13. Prior to the commencement of any flight, the PIC must ensure that no operations are conducted without verifying that the intended flight path is available and free and clear of conflicts.
14. Amazon must not dispose of its life-limited parts in a manner that would lead to them being installed on any type-certificated aircraft without the recipient having knowledge of the accumulated time on the part.
15. All operations must be conducted under day visual meteorological conditions (VMC) only, until such time when the UAS has been found appropriately equipped to operate in conditions other than VMC. Flights under special visual flight rules (SVFR) are not authorized.
16. The MK27 UAS pilot interface must display all of the following information from the MK27 UA in real time: altitude, position, direction of flight information, and flight mode. All of the information identified in this condition and limitation must be available at all times to the PIC, when conducting flight operations.
17. The MK27 UAS pilot interface must provide an audible and visual alert of degraded system performance, UAS malfunction, and loss of Command and Control link with the MK27 UA. When conducting operations, this information must be available at all times to the PIC.
18. The MK27 UAS must detect engine failures and the pilot interface must provide an alert of any engine failure.
19. Amazon must provide sufficient Aircraft Observers (AOs) and Safety Officers (SOs) so that they can adequately perform visual or audible identification of abnormal aircraft behavior during flight from the ground.
20. Amazon is authorized to conduct operations at a UA-to-pilot ratio of 1 to 1. Amazon must receive FAA approval for any increase in the UA-to-pilot ratio permitted by this condition and limitation.

21. Prior to each operation, Amazon must designate safe emergency landing area(s) which the UA can reach if it is unable to complete the intended flight; and, identify such emergency landing area(s) to the PIC and GSO operating aircraft in that area. The emergency landing area(s) must:
 - a. Be no less than 100 feet in diameter;
 - b. Be known in advance to the PIC and GSO operating aircraft in that area;
 - c. Be at least 250 feet from structures, vehicles, human beings, and roads; and
 - d. Provide for a landing without undue hazard to human beings or property on the ground.

22. Amazon must adhere to all of the following requirements when conducting operations under this exemption:
 - a. Operations over or within 250 feet laterally of moving vehicles are prohibited.
 - b. Sustained flight within 250 feet laterally of roadways is prohibited.
 - c. Operations over human beings and structures are prohibited. Additionally, the UA must remain at least 100 feet laterally from any person or structure during all phases of flight.
 - d. Transitions over roadways are prohibited except as provided in the FAA-approved Amazon Prime Air MK27, Concept of Operations.
 - e. Operations are permitted only in sparsely populated areas.

23. Amazon must obtain certification and frequency assignments (licenses) from the National Telecommunications and Information Administration (NTIA) (47 CFR part 300), or Federal Communications Commission (FCC) equipment authorization (47 CFR part 2, Subpart J and 47 CFR part 87, Subpart D) and FCC frequency licenses (47 CFR part 87), as applicable. NTIA and FCC approvals for the control link, ATC radios, transponders, detect and avoid systems (including automatic dependent surveillance broadcast (ADS-B)), and navigation systems, used to support the UAS operations must be in place prior to operating the UAS in the NAS. Equipment authorized and licensed under other parts of the FCC rules will be considered on a case-by-case basis, by the FCC, provided the equipment operates under a primary allocation, has co-equal status with other systems in the frequency band, and there is band frequency coordinator responsible for de-conflicting operations in the band. Equipment licensed under 47 CFR part 5 (Experimental) or 47 CFR part 15 (Radio Frequency Devices) will not be considered for UAS communications by the FAA because systems that operate under these parts of the FCC rules do not have the protection necessary to ensure operational safety in the NAS.

24. The MK27 UAS may not be operated by any person from any moving vehicle or aircraft.
25. An MK27 UAS that has undergone maintenance or alterations that affect the MK27 UAS operation or flight characteristics (e.g. replacement of a flight critical component) must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights must be conducted by a PIC within visual line-of-sight, or BVLOS with a visual observer. Functional test flights must be conducted with any other personnel required to conduct the functional test flight (such as a mechanic or technician) and must remain at least 500 feet from all other non-participating people. The functional test flight must be conducted in accordance with the Amazon Prime Air MK27, Unmanned Aircraft Maintenance Manual and in a manner that does not pose an undue hazard to human beings and property.
26. Amazon must comply with 14 CFR part 43 with respect to any maintenance, rebuilding, and alteration of the MK27 UAS, as if the aircraft has a standard airworthiness certificate. For purposes of this exemption, including compliance with this condition and limitation:
 - a. Amazon is considered the aircraft manufacturer.
 - b. Airworthiness means the aircraft is in a condition that meets the FAA-approved configuration described in the Amazon Prime Air MK27, Configuration Document; and, is in a condition for safe operation.
27. The ground station remotes must be available, functional, and staffed prior to the commencement of any flight.
28. This exemption is not valid for operations outside the United States.

If you request an extension to this exemption, please submit your request by using the Regulatory Docket No. FAA-2019-0622 (<http://www.regulations.gov>). In addition, you should submit your request no later than 120 days prior to the exemption's expiration date listed below.

If you require an amendment to this exemption, please submit your request no later than 120 days prior to the date you need the amendment using the process indicated above.

Any extension or amendment request must meet the requirements of §11.81 of 14 CFR.

This exemption terminates on September 30, 2022, unless sooner superseded or rescinded for any reason, including the issuance of a type certificate.

Issued in Washington, D.C., on August 27, 2020.