

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98057-3356

In the matter of the petition of

Gulfstream Aerospace Corporation

for an exemption from § 25.1447(c)(1) of
Title 14, Code of Federal Regulations

Regulatory Docket No. FAA-2015-3311

GRANT OF EXEMPTION

By letter dated July 30, 2015, Mr. Robert Glasscock, Gulfstream Aerospace Corporation, P.O. Box 2206, M/S R-02, Savannah, GA 31402-2206, petitioned the Federal Aviation Administration (FAA) for an exemption from a requirement in § 25.1447(c)(1), at Amendment 25-116, of Title 14, Code of Federal Regulations (14 CFR). This exemption, if granted, would permit relief from the requirement that oxygen-dispensing units must be automatically presented to occupants before the cabin pressure altitude exceeds 15,000 feet on Gulfstream Model GVII-G500 airplanes and subsequent derivatives.

The petitioner requests relief from the following regulation(s):

Section 25.1447(c)(1) requires, in pertinent part, that there must be an oxygen-dispensing unit connected to oxygen-supply terminals immediately available to each occupant, wherever seated. If certification for operation above 30,000 feet is requested, the dispensing units providing the required oxygen flow must be automatically presented to the occupants before the cabin-pressure altitude exceeds 15,000 feet, and the crew must be provided with a manual means to make the dispensing units immediately available in the event of failure of the automatic system.

The petitioner supports its request with the following information:

This section quotes the relevant information from the petitioner's request, with minor edits for clarity. The complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at <http://regulations.gov>, in Docket No. FAA-2015-3311.

Relief from section 14 CFR Part 25.1447(c)(1) Amdt. 25-116

Gulfstream Aerospace Corporation (Gulfstream) of Savannah, Georgia has submitted application to the FAA's Atlanta Aircraft Certification Office for type certification of a new, twin-engine, transport category aircraft to be known as the Gulfstream model GVII-G500. Gulfstream ODA project number TC-01-2010-0024 has been assigned to this effort. Gulfstream intends to certify the GVII-G500 and any subsequent derivative models to support landing field elevations (LFE) of up to 15,000 feet.

14 CFR 25.1447(c)(1), Amendment 25-116 states in part that an oxygen-dispensing unit must be connected to oxygen-supply terminals immediately available to each occupant, wherever seated. If certification for operation above 30,000 feet is requested, the dispensing units providing the required oxygen flow must be automatically presented to the occupants before the cabin pressure altitude exceeds 15,000 feet, and the crew must be provided with a manual means to make the dispensing units immediately available in the event of failure of the automatic system.

In accordance with the provisions of 14 CFR 11.81, Gulfstream requests an exemption to 14 CFR 25.1447(c)(1). This will allow the GVII-G500 and any subsequent derivative models to operate in and out of airports with landing field elevations approaching 15,000 feet and will prevent nuisance deployment of oxygen masks. Gulfstream is proposing alternative design requirements to provide an appropriate equivalent level of safety. This information provided herewith will outline this rationale.

Supportive Information

Nagqu Daging Airport is a new airport under construction in northern Tibet. The airport is scheduled to be completed in 2015 and will have a landing field elevation (LFE) of 14,554 ft above sea level (excluding barometric pressure variations). This airport will help improve the transportation conditions in the region.

In order for the GVII-G500 and any subsequent derivative models to provide the additional capability for landing at airports [with elevations] up to 15,000 feet, the Cabin Pressure Control System (CPCS) and the passenger oxygen control panel will be configured to allow the cabin internal pressure altitude to reach as high as 15,300 feet during normal operations.

Factors supporting the Petition

14 CFR 25.1447(c)(1) was designed to provide passenger safety during flight conditions.

Gulfstream proposes that passenger safety can be maintained during all flight conditions and can be further enhanced with simple and logical flight crew procedures to allow operation at high [elevation] airports. The changes proposed are designed to maintain an equivalent level of safety during flight while minimizing the possibility of nuisance passenger-oxygen-mask deployment during takeoff and descent at high [elevation] airports.

The GVII-G500 and any subsequent derivative models will be designed to provide operations into high LFE airports. The design will prevent nuisance deployment of the passenger oxygen masks when operating into and out of airports up to 15,000 feet LFE. 14 CFR 25.1447(c)(1) states that oxygen dispensing units must be presented to the occupants before the cabin pressure exceeds 15,000 feet and that the crew must have a manual means of making dispensing units available in the event of a failure of the automatic system. An exemption is requested to allow a maximum oxygen altitude limit of more than 15,000 feet.

The passenger oxygen control system design will account for field elevations up to 14,000 ft, and will have a secondary setting for high field elevations. To provide this, the Passenger Oxygen Control Panel will have an airport elevation selection switch installed that has two positions:

- “NORMAL” – Automatic passenger oxygen mask activation at $14,750 \pm 250$ feet
- “HI ALT” – Automatic passenger oxygen mask activation at $15,750 \pm 250$ feet

During operations into and out of an airport with a landing field elevation greater than 14,000 ft, “HI ALT” must be selected in order to reset the automatic passenger oxygen mask activation to approximately 15,750 feet and prevent a nuisance deployment of the passenger oxygen masks.

The switch will remain in the “HI ALT” position during ground operations. An indication light on the switch will be illuminated when it is in the “HI ALT” position so that the crew is reminded to reset the switch after departure from high [elevation] airports. The indication light will turn off when the switch is reset to “NORMAL.” The manual mask deployment feature is available regardless of switch position.

Gulfstream will include AFM operational procedures for $LFE \leq 14,000$, and procedures for $LFE > 14,000$ feet. For operations at LFEs $> 14,000$ feet, the procedures will instruct the crew to depress the “HI ALT” switch on the passenger oxygen control panel during descent and similarly after take-off when the cabin altitude has decreased below 14,000 feet.

The AFM high elevation procedures will require that after engine start, the cockpit crew will wear oxygen masks until the cabin altitude is less than 10,000 feet. If the airplane takes off unpressurized for any reason (crew error, CPCS failure etc.) when departing an airport with elevation above 14,500 feet, the oxygen masks will be automatically presented to the passengers at $15,750 \pm 250$ feet. The passengers who boarded the airplane from high altitude airports should already be acclimated to the elevation.

The crew will be alerted to Low Cabin Pressure at cabin altitudes appropriate for high landing field elevation. The CPCS logic, (which is discussed in the AFM), specifies that during descent/climb the Cabin Pressure Low Warning is reset according the LFE selected (see below):

| Landing Field Elevation (Entered in FMS) | Cabin Pressure Low Warning Setpoint for Aircraft with 15,000 feet LFE Maximum |
|---|--|
| Less than or equal to 7,500 feet | 8,000 feet |
| 7,500 < LFE ≤ 9,500 feet | 10,000 feet |
| 9,500 < LFE ≤ 14,000 feet | 14,500 feet |
| 14,000 feet to 15,000 feet | 15,500 feet |

A Blue CAS message “Cabin Alt Alert Exceeds 10K” will display anytime the Cabin Pressure Low Warning is set above 10,000 ft.

For high field elevation, during ground operation and at the start of climb, the Cabin Pressure Low Warning can start as high as 16,000 ft (LFE + 1000 ft) and is reset towards 8,000 ft as the cabin altitude decreases. During climb whenever the aircraft is above 34,000 ft, the Cabin Pressure Low Warning is reset to 8,000 ft and remains at 8,000 feet in cruise regardless of the LFE. During descent the Cabin Pressure Low Warning is reset according to the LFE selected.

The additional 15,500-ft set point allows a 500-foot margin above maximum LFE to account for the Cabin Pressure Controller Unit (CPCU) internal sensor tolerance plus additional margin to prevent nuisance warnings.

The passenger oxygen control system for the GVII-G500, and any subsequent derivative models, will incorporate a digital cabin pressure altitude sensor. This design will increase the accuracy and reliability of the passenger oxygen system over previous mechanical aneroid control systems. The new design will utilize a 3-way knob (OFF, AUTO, and MANUAL selections). In the event of a failure of the automatic system to deploy the passenger oxygen masks, indication will provide to the crew through CAS message alert. The flight crew will then have the ability to manually deploy the oxygen masks to the passengers.

The GVII aircraft models will comply with 14 CFR 25.1447(c)(1) under all other conditions since the “NORMAL” set point for passenger mask deployment is 14,750 ft. Gulfstream will include all detailed instructions for High Field Elevation operation in the Airplane Flight Manual (AFM).

Effect of the Exemption on Safety

The exemption requested will not adversely affect the level of safety provided for the GVII-G500 and any subsequent derivative models.

The safety features described above are to ensure the avoidance of nuisance oxygen-mask deployment while still allowing deployment in the event of a CPCS failure during operations into high LFE airports. The proposed CPCS will comply with 14 CFR 25.841(a)(1) as there are no probable failure conditions in the pressurization system that would cause the cabin pressure to exceed 15,000 feet. The CPCS and passenger oxygen

control panel meet or exceed the FAA probability of failure requirements in all areas. As stated earlier, in the event of an unannounced CPCS failure, the oxygen masks will drop automatically at a cabin altitude of no more than 16,000 feet, same as the Gulfstream Model GVI. Manual passenger oxygen mask deployment is always available to the crew in the event of Low Cabin Pressure indication, and the cabin oxygen masks fail to automatically deploy.

The design of the GVII-G500 pressurization and oxygen systems and the AFM procedures provide for a safe environment for the crew and passengers while allowing for operation into and out of landing field elevations of up to and including 15,000 ft.

Issue of Public Interest

Gulfstream Aerospace Corporation designs, develops, manufactures, markets and services the world's most technologically advanced business jet aircraft to an International market. Gulfstream's leadership position in the global business jet market is due to the efforts of its nearly ten thousand employees in the manufacturing plants, completion centers, and services centers across North America. The corporation utilizes numerous products, such as avionics and environmental control systems, from scores of suppliers located throughout the United States.

Gulfstream competes for new business all over the world. This exemption will directly impact the high-altitude utility of the GVII-G500, and any subsequent derivative models, thereby having a direct effect on sales. High Landing field elevation operations are being requested by prospective aircraft operators who compare the GVII-G500 airplane, or derivatives, with products of European and other aircraft manufacturers located outside the United States. This operational capability will make Gulfstream aircraft more marketable to these prospective operators. This exemption as proposed above is in essence an alternative method of achieving an appropriate level of safety, while at the same time providing features attractive to prospective purchasers.

The manufacture, completion, and support of Gulfstream aircraft would aid in the stabilization of the job market as well as the growth of the American economy, which is in the interest of the public.

Waiver of Notice and Public Procedure

Gulfstream Aerospace Corporation respectfully requests that action on this petition should not be delayed by publication and comment procedures. Gulfstream believes that the nature of this exemption does not set a precedent and this exemption is effectively identical to those previously granted for which [there] were no public comments.

Previously Granted Exemptions:

- Exemption No. 9940, Gulfstream GVI

- Exemption No. 6076, Boeing 757
- Exemption No. 8668A, Boeing 737
- Exemption No. 9801, Boeing 787
- Exemption No. 6994, Airbus A320

Operation Outside the United States

In accordance with 14 CFR 11.81 (h), Gulfstream requests consideration be given to extending this exemption for operation outside of the United States. Gulfstream aircraft are routinely registered and operated outside of the United States and projections are the same for the GVII-G500 and its derivatives. Gulfstream believes that limiting this exemption to use within the United States would put unfair restrictions on the marketability of this aircraft. Conclusion:

Gulfstream believes that the above arguments favor an exemption from 14 CFR 25.1447(c)(1) that would allow uncomplicated operations into landing fields up to 15,000 feet elevation for the GVII-G500 and its derivatives. In addition, Gulfstream believes that an exemption is in the public interest and will not adversely affect passenger safety.

Federal Register publication

The FAA has determined that good cause exists for waiving the requirement for *Federal Register* publication for public comment because the request is identical in all material respects to previously granted exemptions; the exemption, if granted, would not set a precedent; and any delay in acting on this petition would be detrimental to the Gulfstream Aerospace Corporation.

The FAA's analysis

The FAA considers that granting an exemption to a part of § 25.1447(c)(1) is in the public interest for the reasons stated by the petitioner, and because the exemption is the same in all material respects to previously granted exemptions from the same part of § 25.1447(c)(1).

The petitioner requests an exemption for Gulfstream Model GVII-G500 airplanes and seeks relief from the requirement in § 25.1447(c)(1), which states that oxygen-dispensing units must be automatically presented to occupants before the cabin pressure altitude reaches 15,000 feet. A requirement for automatic presentation of oxygen masks for airplanes certificated to operate above 30,000 feet originated in § 4b.651(d)(3)(i) of the Civil Aviation Regulations (CAR) and was carried over as § 25.1447(c)(1) when 14 CFR part 25 was codified. The CAR requirement did not specify the maximum cabin pressure altitude allowed prior to presentation. The requirement that the oxygen-dispensing units be automatically presented before the cabin pressure altitude reaches 15,000 feet was added at Amendment 25-41, effective September 1, 1977.

For operation of the Gulfstream Model GVII-G500 airplane into and out of an airport with a landing field elevation above 14,000 feet, the flightcrew must activate the “HI ALT” high airport-elevation selection switch located on the Passenger Oxygen Control Panel. This results in automatic deployment of the passenger oxygen masks when the cabin pressure altitude is 15,750 feet, \pm 250 feet. This feature is necessary to reduce the occurrence of inadvertent deployment of oxygen masks.

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. §§ 40113 and 44701 delegated to me by the Administrator, I grant Gulfstream Aerospace Corporation an exemption from the requirement of 14 CFR 25.1447(c)(1) that the passenger oxygen equipment must be automatically presented before the cabin pressure altitude exceeds 15,000 feet. For Gulfstream Model GVII-G500 series airplanes and subsequent derivatives, this grant of exemption will permit passenger oxygen masks to be automatically presented before the cabin pressure altitude exceeds 16,000 feet when operating into and out of airports with altitudes above 14,000 feet.

Issued in Renton, Washington, on November 11, 2015.

/s/

Michael Kaszycki
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service