

August 5, 2014  
A&C-14-DRAFT

U.S. Department of Transportation  
Docket Operations, M-30  
West Building Ground Floor, Room W12-140  
1200 New Jersey Avenue, SE  
Washington, D.C. 20590

Subject: Gulfstream Aerospace Corporation – Petition for Exemption from 14 CFR Part 91.211(b)(1)(ii), Supplemental Oxygen requirements as applicable to certain Gulfstream Large Cabin Airplanes

Reference: 1) Gulfstream Aerospace Corporation report GIVX-GER-1635, Rev. A

Exhibits: A) Reference 1 report excerpts (as redacted)

Dear Sir or Madam:

As provided by 14 CFR 11.81(b), Gulfstream Aerospace Corporation hereby petitions for relief from the rule as defined below as it applies to Gulfstream G-V, G280, G350, G450, G500, G550, G650 and G650ER airplanes:

14 CFR 11.81(b) - Sections from which relief is sought:

14 CFR 91.211(b)(1)(ii) –

“(b) Pressurized cabin aircraft.

(1) No person may operate a civil aircraft of U.S. registry with a pressurized cabin—

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(ii) At flight altitudes above flight level 350 unless one pilot at the controls of the airplane is wearing and using an oxygen mask that is secured and sealed and that either supplies oxygen at all times or automatically supplies oxygen whenever the cabin pressure altitude of the airplane exceeds 14,000 feet (MSL), except that the one pilot need not wear and use an oxygen mask while at or below flight level 410 if there are two pilots at the controls and each pilot has a quick-donning type of oxygen mask that can be placed on the face with one hand from the ready position within 5 seconds, supplying oxygen and properly secured and sealed.”

14 CFR 11.81(c) - Extent and reason for seeking relief:

The Gulfstream types for which relief is sought commonly operate over long distance routes that require step climbs to altitudes up to FL 450 for the G280, G350 and G450, and up to FL 510 for the G-V, G500, G550, G650 and G650ER types. The duration of these flights causes flight crews to be exposed for long periods of time to the effects of oxygen and the fatiguing presence of a sealed mask on the face.

The exemption is thus requested to provide relief to flight crews from fatigue-inducing and distracting requirements which have now become counter to the current effort by FAA of eliminating potentially fatiguing and distracting impediments to flight crew during operations in the greater interest of safety.

Compliance with the current requirements of these regulations in these airplane types currently require at a minimum one pilot to wear a mask for extended hours of long-range operations above FL 410. The resulting fatigue and distraction may be considered as counter to current efforts to ensure a more desirable level of crew effectiveness as a given flight of this type progresses.

#### 14 CFR 11.81(d) - Public interest / benefit:

Relief from the current literal requirements of 14 CFR 91.211(b)(1)(ii) would serve to significantly relieve flight crews from the fatiguing burden of wearing a mask and the effects of long-term oxygen use and thereby support a better expectation of crew readiness as a given flight progresses. Passengers, all users of the airspace, and the general public will benefit from a general improvement in crew readiness and effectiveness, especially during arrival / approach phases after a long flight or should some emergency condition arise.

The extended wearing of an oxygen mask and use of oxygen for the periods involved on these models above FL 410 increases fatigue and degrades crew performance.

The health of flight crews may also be adversely affected by the extended use of oxygen, as noted by AC 61-107A, Chapter 1, Recommendations for High-Altitude Training, paragraph 106.h. –

“Prolonged oxygen use can also be harmful to human health. One hundred percent aviation oxygen can produce toxic symptoms if used for extended periods of time. The symptoms can consist of bronchial cough, fever, vomiting, nervousness, irregular heartbeat, and lowered energy. These symptoms appeared on the second day of breathing 90 percent oxygen during controlled experiments. It is unlikely that oxygen would be used long enough to produce the most severe symptoms in any aviation incidence. However, prolonged flights at high altitudes using a high concentration of oxygen can produce some symptoms of oxygen poisoning such as infection or bronchial irritation.”

This situation, especially as described in the above closing sentence (underscored for emphasis) is of direct concern on the models cited by this petition due to the extended hours of high altitude long-distance flights that are common among these types.

#### 14 CFR 11.81(e) - Information supporting this petition:

The relief sought will not compromise the level of safety now-intended by the current rule but rather will enhance safety if this exemption is approved.

- The cited models are all equipped with quick-donning oxygen masks for the flight crew which may be placed upon the face of the pilot with one hand within 5 seconds.
- The cited models all have passive door seals.
- Collectively, this group of airplane types has flown a total of more than 1,983,135 hours without experiencing a sudden uncontrollable decompression.
- Certification testing of these models at the maximum certified altitudes demonstrated adequate time for crew members to don masks and take remedial action prior to the aircraft altitude reaching hazardous levels; tests demonstrated success in up to seven scenarios involving various Effective Leakage Areas (ELAs) and aircraft pressurization (bleed supply) configurations (examples are attached).

- Should an uncontrollable depressurization occur and exceed the rate of cabin climb demonstrated during Certification testing, these models all have an autopilot with autothrottles that feature an emergency descent mode which automatically operates in the absence of crew action (for protection in the event of an incapacitated flight crew):
  - o Should the cabin altitude exceed 8,000 feet, a red “Cabin Pressure Low” Crew Alert System (CAS) warning will be displayed;
  - o If the aircraft is in coupled flight (autopilot engaged) at or above 40,000 feet when the cabin reaches 8,000 feet of altitude, the aircraft will enter an emergency descent – turning left ninety (90) degrees and beginning a rapid descent to fifteen thousand (15,000) feet;
  - o The autothrottles, if not engaged, will engage and reduce power to idle, allowing the airplane to descend at Mmo/Vmo
  - o Implementing this exemption will allow operations in-line with ICAO Annex 6 supplemental oxygen rules

#### 14 CFR 11.81(g) - Additional information:

As cited above in response to 14 CFR 11.81(d), the extended wearing of an oxygen mask and use of oxygen for the periods involved on these models above FL 410 increases fatigue and degrades crew performance.

It should be further noted that the health of flight crews may also be adversely affected by the extended use of oxygen, as noted by AC 61-107A, Chapter 1, Recommendations for High-Altitude Training, paragraph 106.h.:

*“Prolonged oxygen use can also be harmful to human health. One hundred percent aviation oxygen can produce toxic symptoms if used for extended periods of time. The symptoms can consist of bronchial cough, fever, vomiting, nervousness, irregular heartbeat, and lowered energy. These symptoms appeared on the second day of breathing 90 percent oxygen during controlled experiments. It is unlikely that oxygen would be used long enough to produce the most severe symptoms in any aviation incidence. However, prolonged flights at high altitudes using a high concentration of oxygen can produce some symptoms of oxygen poisoning such as infection or bronchial irritation.”*

This situation, especially as described in the above closing sentence (underscored for emphasis) is of direct concern on the models cited by this petition due to the extended hours of high altitude long-distance flights that are common among these types.

Additionally, it should be realized that the airplanes in this group of models frequently operate over long-distance over-water routes, often of Extended Range Operations (EROPS/ETOPS) type flights. When oxygen is consumed by the flight crew as a precautionary measure, as now required, then an increased risk of insufficient oxygen for emergency use becomes a concern. Contingencies that would require an ample reserve might include events such as smoke in the cockpit, or a depressurization requiring crew oxygen for an extended period such as to transit to higher altitude for terrain or to fly above hazardous icing conditions, or similar. The relief sought would provide a better safeguard against a shortfall in such a case.

A practical consideration also exists in that many such long-range flights have destinations with minimum or primitive servicing facilities: these models are typically operated outside of the commercial lanes and facilities enjoyed by scheduled air carriers and must rely on independent operators at more remote airfields for fuel, oil, catering, lavatory servicing and cleaning and other services. Many supplies may be carried in compensation of this risk – oil and other fluids and certain other expendables, but the

transport of spare oxygen is not a practical consideration. Conservation is therefore a necessity and provides a better margin of safety in overall terms. Further, oxygen service at remote facilities may raise concern as to quality where there can be no room for error with regard to contamination or similar issues.

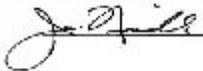
Summary:

The exemption from the requirement for pilots to use supplementary oxygen when operating at FL 410 and above as stated in 14 CFR 91.211(b)(1)(ii), if granted, would result in eliminating a source of fatigue for flight crews, promote flight crew health, enhance safety by preserving the supplemental oxygen for use in instances when it is essential for crew survival, and eliminate the risks associated with replenishing the oxygen supply from sources of questionable integrity. The extensive operational experience of the combined fleet of G-V, G280, G350, G450, G500, G550, G650 and G650ER aircraft without an instance of uncontrolled decompression, evidence in Certification testing and the incorporation of automatic autopilot/autothrottles emergency descent mode protection all establish a level of safety equal to or exceeding the requirements of the rule.

Gulfstream appreciates FAA's consideration of this petition for exemption to 14 CFR 91.211(b)(1)(ii) and looks forward to the earliest possible and favorable disposition so that the benefits as stated here may be realized for all operators of the cited models.

If there are any questions, or if I can be of further assistance, please do not hesitate to contact Richard J. Trusis at (912) 965-6536 or at [rick.trusis@gulfstream.com](mailto:rick.trusis@gulfstream.com).

Sincerely,



for

Richard J. Trusis, Director -  
Airworthiness & Certification

CC: J. O'Meara, Gulfstream Flight Operations