

**DEPARTMENT OF TRANSPORTATION****Federal Aviation Administration****14 CFR Part 25**

[Docket No. FAA-2024-1328; Special Conditions No. 25-866-SC]

**Special Conditions: Gulfstream Aerospace Corporation (Gulfstream) Model GVII-G400 Airplane; Seats With Inflatable Lapbelts**

**AGENCY:** Federal Aviation Administration (FAA), Department of Transportation (DOT).

**ACTION:** Final special conditions, request for comment.

**SUMMARY:** These special conditions are issued for the Gulfstream Model GVII-G400 airplane. This airplane will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is seating with inflatable lapbelts. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**DATES:** This action is effective on Gulfstream on July 12, 2024. Send comments on or before August 26, 2024.

**ADDRESSES:** Send comments identified by Docket No. FAA-2024-1328 using any of the following methods:

- **Federal eRegulations Portal:** Go to [www.regulations.gov](http://www.regulations.gov) and follow the online instructions for sending your comments electronically.

- **Mail:** Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE, Room W12-140, West Building Ground Floor, Washington, DC 20590-0001.

- **Hand Delivery or Courier:** Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

- **Fax:** Fax comments to Docket Operations at 202-493-2251.

**Docket:** Background documents or comments received may be read at [www.regulations.gov](http://www.regulations.gov) at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue SE, Washington,

DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Myra Kuck, Cabin Safety, AIR-624, Technical Policy Branch, Policy and Standards Division, Aircraft Certification Service, Federal Aviation Administration, 3960 Paramount Blvd., Suite 100, Lakewood, CA 90712, telephone and fax (405) 666-1059; email [myra.j.kuck@faa.gov](mailto:myra.j.kuck@faa.gov).

**SUPPLEMENTARY INFORMATION:****Comments Invited**

The substance of these special conditions has been published in the **Federal Register** for public comment in several prior instances with no substantive comments received. Therefore, the FAA finds, pursuant to 14 CFR 11.38(b), that new comments are unlikely, and notice and comment prior to this publication are unnecessary.

**Privacy**

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in title 14, Code of Federal Regulations (14 CFR), § 11.35, the FAA will post all comments received without change to [www.regulations.gov](http://www.regulations.gov), including any personal information you provide. The FAA will also post a report summarizing each substantive verbal contact received about these special conditions.

**Confidential Business Information**

Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to these special conditions contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to these special conditions, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as "PROPIN." The FAA will treat such marked submissions as confidential under the FOIA, and the indicated comments will not be placed in the public docket of these proposed special conditions. Send submissions containing CBI to the individual listed in the **FOR FURTHER INFORMATION CONTACT** section above. Comments the FAA receives, which are not specifically designated as CBI, will be placed in the public docket for these proposed special conditions.

**Comments Invited**

The FAA invites interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

The FAA will consider all comments received by the closing date for comments, and will consider comments filed late if it is possible to do so without incurring delay. The FAA may change these special conditions based on the comments received.

**Background**

On December 15, 2020, Gulfstream applied for an amendment to Type Certificate No. T00021AT to include the new Model GVII-G400. The Gulfstream Model GVII-G400 airplane, which is a derivative of the Model GVII-G500 currently approved under Type Certificate No. T00021AT, is a twin-engine business jet, with a maximum seating capacity for 19 passengers, and a maximum take-off weight of 73,500 pounds.

**Type Certification Basis**

Under the provisions of title 14, Code of Federal Regulations (14 CFR), § 21.101, Gulfstream must show that the Model GVII-G400 airplane meets the applicable provisions of the regulations listed in Type Certificate No. T00021AT, or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

If the Administrator finds that the applicable airworthiness regulations (e.g., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Gulfstream Model GVII-G400 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Gulfstream Model GVII-

G400 airplane must comply with the exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with 14 CFR 11.38, and they become part of the type certification basis under § 21.101.

#### Novel or Unusual Design Features

The Gulfstream Model GVII-G400 airplane will incorporate the following novel or unusual design feature:

Seating with inflatable lapbelts.

#### Discussion

An inflatable lap belt is designed to limit occupant forward excursion in the event of an accident, and thereby reduce the potential for head injury. The inflatable lap belt behaves similarly to an automotive inflatable airbag, but in this case the airbag is integrated into the lap belt and inflates away from the seated occupant. While inflatable airbags are now standard in the automotive industry, the use of an inflatable lap belt is novel for commercial aviation.

Occupants must be protected from head injury, as required by § 25.785, either by eliminating any injurious object within the striking radius of the head, or by installing padding. Traditionally, this has required either a setback of 35 inches from any bulkhead or other rigid interior feature or, where not practical, the installation of specified types of padding. The relative effectiveness of these established means of injury protection was not quantified. With the adoption of Amendment 25-64 to part 25, specifically § 25.562, a new standard was created that quantifies required head-injury protection.

Each seat-type design approved for crew or passenger occupancy during takeoff and landing, as required by § 25.562, must successfully complete dynamic tests or be demonstrated by rational analysis based on dynamic tests of a similar type seat. In particular, the regulations require that persons not suffer serious head injury under the conditions specified in the tests, and that protection must be provided, or the seat be designed, so that head impact does not exceed a (head injury criteria) HIC value of 1,000 units. While the test conditions described for HIC are detailed and specific, it is the intent of the requirement that an adequate level of head-injury protection be provided for passengers in a severe crash.

Because §§ 25.562 and 25.785 and associated guidance do not adequately address seats with inflatable lap belts, the FAA recognizes that appropriate

pass/fail criteria need to be developed that fully address the safety concerns specific to occupants of these seats.

The inflatable lap belt has two potential advantages over other means of head-impact protection. First, it can provide significantly greater protection than would be expected with energy-absorbing pads, and second, it can provide essentially equivalent protection for occupants of all stature. These are significant advantages from a safety standpoint because such devices will likely provide a level of safety that exceeds the minimum standards of part 25. Conversely, inflatable lap belts in general are active systems and must be relied upon to activate properly when needed, as opposed to an energy-absorbing pad or upper torso restraint that is passive and always available. Therefore, the potential advantages must be balanced against this and other potential disadvantages to develop standards for this design feature.

The FAA has considered the installation of inflatable lap belts to have two primary safety concerns: First, that they perform properly under foreseeable operating conditions; and second, that they do not perform in a manner or at such times as would constitute a hazard to the airplane or occupants. This latter point has the potential to be the more rigorous of the requirements, owing to the active nature of the system.

The inflatable lap belt will rely on electronic sensors for signaling, and will employ an automatic inflation mechanism for activation, so that it is available when needed. These same devices could be susceptible to inadvertent activation, causing deployment in a potentially unsafe manner. The consequences of such deployment must be considered in establishing the reliability of the system. An applicant must substantiate that the effects of an inadvertent deployment in flight are either not a hazard to the airplane, or that such deployment is an extremely improbable occurrence (less than  $10^{-9}$  per flight hour). The effect of an inadvertent deployment on a passenger or crewmember that might be positioned close to the inflatable lap belt should also be considered. The person could be either standing or sitting. A minimum reliability level will have to be established for this case, depending upon the consequences, even if the effect on the airplane is negligible.

Because the inflatable lap belt is essentially a single-use device, it could potentially deploy under crash conditions that are not sufficiently severe as to require head-injury protection from the inflatable lap belt.

And because an actual crash is frequently composed of a series of impacts before the airplane comes to rest, this could render the inflatable lap belt useless if a larger impact follows the initial impact. This situation does not exist with energy-absorbing pads or upper-torso restraints, which tend to provide continuous protection regardless of severity or number of impacts in a crash event. Therefore, the inflatable lap-belt installation should be such that the inflatable lap belt will provide protection when it is required, by not expending its protection during a less-severe impact. Also, it is possible to have several large impact events during the course of a crash, but there will be no requirement for the inflatable lap belt to provide protection for multiple impacts. An acceptable method to show an inflatable lap belt deploys at an appropriate time is to conduct threshold testing to demonstrate the device trigger G-level is high enough to prevent false activations and low enough to deploy the airbag in time to protect the occupant. A threshold pulse that is scaled down from the required 16g, 90 ms triangular pulse in § 25.562 is used. The FAA considers a suitable trigger force and time to fire range of 7.5g with 1.5 m/s at 42 ms and 9.3g with 2.4 m/s at 52 ms to be acceptable. FAA TSO-C127c, Appendix 1 provides additional information on sensor-driven restraint systems where it modifies AS8049C by adding subsection 5.3.1.5.

Since each occupant's restraint system provides protection for that occupant only, the installation must address seats that are unoccupied. It will be necessary for Gulfstream to show that the required protection is provided for each occupant regardless of the number of occupied seats, considering that unoccupied seats may have lap belts that are active.

The inflatable lap belt should be effective for a wide range of occupants. The FAA has historically considered the range from the 5th percentile female to the 95th percentile male as the range of occupants that must be taken into account. In this case, the FAA is proposing consideration of a broader range of occupants due to the nature of the lap-belt installation and its close proximity to the occupant. In a similar vein, these persons could have assumed the brace position for those accidents where an impact is anticipated. Test data indicate that occupants in the brace position do not require supplemental protection, so it would not be necessary to show that the inflatable lap belt will enhance the brace position. However, the inflatable lap belt must not

introduce a hazard when it is deployed into a seated, braced occupant.

Another area of concern is the use of seats so equipped by children, whether lap-held, in approved child safety seats, or occupying the seat directly. Similarly, if the seat is occupied by a pregnant woman, the installation should address such usage, either by demonstrating that it will function properly, or by adding appropriate limitation on usage.

Since the inflatable lap belt will be electrically powered, there is the possibility that the system could fail due to a separation in the fuselage. Since this system is intended as crash/post-crash protection means, failure to deploy due to fuselage separation is not acceptable. As with emergency lighting, the system should function properly if such a separation occurs at any point in the fuselage. As required by § 25.1353(a), operation of the existing aircraft electrical equipment should not adversely impact the function of the inflatable lap belt under all foreseeable conditions.

Because the inflatable lap belt is likely to have a large volume displacement, the inflated bag could potentially impede egress of passengers. However, the lap-belt bag deflates to absorb energy, so it is likely that an inflatable lap belt would be deflated by the time passengers begin to leave their seats. Nonetheless, it is appropriate to specify a time interval after which the inflatable lap belt may not impede rapid egress. The maximum time allowed for an exit to open fully after actuation is 10 seconds, according to § 25.809(b)(2). Therefore, the FAA has established 10 seconds as the time interval that the inflatable lap belt must not impede rapid egress from the seat after it is deployed. In actuality, it is unlikely that a flight attendant would prepare an exit this quickly in an accident severe enough to warrant deployment of the inflatable lap belt. The inflatable lap belt will likely deflate much more quickly than 10 seconds.

Inflatable lap belts must not impede access to, or opening of, exits. The applicant must show compliance with the exit opening and access requirements of §§ 25.809 and 25.813 with representative inflatable lap belts in both the pre- and post-deployed conditions. The evaluation must include review for obstructions in the egress path and any interferences in opening the exit and must consider each unique interior configuration. Additional project specific guidance may be needed if inflatable lap belts are installed at overwing exit rows.

Part I of appendix F to part 25 specifies the flammability requirements for interior materials and components. There is no reference to inflatable restraint systems in appendix F because such devices did not exist at the time the flammability requirements were written. The existing requirements are based on both material types, as well as use, and have been specified in light of the state-of-the-art of materials available to perform a given function. In the absence of a specific reference, the default requirement would be for the type of material used to construct the inflatable restraint, which is a fabric in this case. However, in writing a special condition, the FAA must also consider the use of the material, and whether the default requirement is appropriate. In this case, the specialized function of the inflatable restraint means that highly specialized materials are needed. The standard normally applied to fabrics is a 12-second vertical ignition test. However, materials that meet this standard do not perform adequately as inflatable restraints. Since the safety benefit of the inflatable restraint is very significant, the flammability standard appropriate for these devices should not screen out suitable materials, thereby effectively eliminating use of inflatable restraints. The FAA needs to establish a balance between the safety benefit of the inflatable restraint, and its flammability performance. At this time, the 2.5-inch per minute horizontal test as defined in 14 CFR part 25, appendix F, part I, paragraph (b)(5) is considered to provide that balance. As the technology in materials progresses (which is expected), the FAA may change this standard in subsequent special conditions to account for improved materials.

The potential for an inadvertent deployment could be increased as a result of conditions in service. The installation must take into account wear and tear so that the likelihood of an inadvertent deployment is not increased to an unacceptable level. In this context, an appropriate inspection interval and self-test capability are considered necessary. In addition, outside influences such as lightning and high intensity radiated fields (HIRF) may also contribute to or cause inadvertent deployment. Existing regulations regarding lightning, § 25.1316, and high-intensity radiated fields (HIRF), § 25.1317 for the GVII-G400 aircraft are applicable. It must be verified that electromagnetic interference present, under foreseeable operating conditions, will not affect the function of the inflatable lap belt or cause inadvertent

deployment. Finally, the inflatable lap belt installation should be protected from the effects of fire, so that an additional hazard is not created by, for example, a rupture of the pyrotechnic squib.

Note that the special conditions are applicable to the inflatable lap-belt system as installed. The special conditions are not an installation approval. Therefore, while the special conditions relate to each such system installed, the overall installation approval is separate, and must consider the combined effects of all such systems installed.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

### Applicability

As discussed above, these special conditions are applicable to the Gulfstream Model GVII-G400 airplane. Should Gulfstream apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

### Conclusion

This action affects only a certain novel or unusual design feature on one airplane model. It is not a rule of general applicability.

### List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

### Authority Citation

The authority citation for these special conditions is as follows:

**Authority:** 49 U.S.C. 106(f), 106(g), 40113, 44701, 44702, and 44704.

### The Special Conditions

■ Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Gulfstream Model GVII-G400 airplanes:

1. The inflatable lap belt must deploy and provide protection under crash conditions where it is necessary to prevent serious head injury. The means of protection must take into consideration a range of stature from a two-year-old child to a 95th percentile male. The inflatable lap belt must provide a consistent approach to energy absorption throughout that range of occupants. In addition, the following situations must be considered:

a. The seated occupant is holding an infant.

b. The seated occupant is a child in a child-restraint device.

c. The seated occupant is a pregnant woman.

2. The inflatable lap belt must provide adequate protection for each occupant regardless of the number of occupants of the seat assembly, considering that unoccupied seats may have an active airbag system in the lap belt.

3. The design must prevent the inflatable lap belt from being either incorrectly buckled or incorrectly installed such that the inflatable lap belt would not properly deploy.

Alternatively, it must be shown that such deployment is not hazardous to the occupant and will provide the required injury protection.

4. The inflatable lap belt system must not be susceptible to inadvertent deployment as a result of wear and tear, or inertial loads resulting from in-flight or ground maneuvers (including gusts and hard landings) likely to be experienced in service.

5. Deployment of the inflatable lap belt must not injure the seated occupant, including injuries that would impede rapid evacuation. This assessment should include an occupant who is in the brace position when it deploys and an occupant whose belt is loosely fastened.

6. It must be shown that inadvertent deployment of the inflatable lap belt, during the most critical part of the flight, will either meet the requirement of § 25.1309(b) or not cause a hazard to the airplane or its occupants.

7. The inflatable lap belt must not impede rapid evacuation of occupants 10 seconds after its deployment.

8. The inflatable lap belt must function properly after loss of normal aircraft electrical power, and after a transverse separation of the fuselage at the most critical location. A separation at the location of the lap belt does not have to be considered.

9. The inflatable lap belt must not release hazardous quantities of gas or particulate matter into the cabin.

10. The inflatable lap belt installation must be protected from the effects of fire such that no hazard to occupants will result.

11. There must be a means for a crewmember to verify the integrity of the inflatable lap belt activation system prior to each flight or it must be demonstrated to reliably operate between inspection intervals.

12. The inflatable material must not have an average burn rate of greater than 2.5 inches/minute when tested using the horizontal flammability test as defined

in 14 CFR part 25, appendix F, part I, paragraph (b)(5).

13. The airbag system in the lap belt, once deployed, must not adversely affect the emergency lighting system (*i.e.*, block proximity lights to the extent that the lights no longer meet their intended function).

14. The inflatable lap belt system must be protected from lightning and high-intensity radiated fields (HIRF). The threats to the airplane specified in existing regulations regarding lightning, § 25.1316, and HIRF, § 25.1317, are adopted by reference for the purpose of measuring lightning and HIRF protection.

Issued in Kansas City, Missouri, on July 8, 2024.

**Patrick R. Mullen,**

*Manager, Technical Policy Branch, Policy and Standards Division, Aircraft Certification Service.*

[FR Doc. 2024–15266 Filed 7–11–24; 8:45 am]

**BILLING CODE 4910–13–P**

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 39

[Docket No. FAA–2024–0467; Project Identifier MCAI–2023–00892–T; Amendment 39–22775; AD 2024–13–01]

RIN 2120–AA64

#### Airworthiness Directives; Bombardier, Inc., Airplanes

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for certain Bombardier, Inc., Model CL–600–2B16 (604 Variant) airplanes. This AD was prompted by a report of sparking due to damaged wire insulation in the fueling adapter. This AD requires inspecting the electrical wires attached to the airplane connector located behind the fuel scupper for damage, and all applicable related investigative and corrective actions. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective August 16, 2024.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of August 16, 2024.

**ADDRESSES:**

*AD Docket:* You may examine the AD docket at [regulations.gov](https://www.regulations.gov) under Docket No. FAA–2024–0467; or in person at

Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the mandatory continuing airworthiness information (MCAI), any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.

*Material Incorporated by Reference:*

- For service information, contact Bombardier Business Aircraft Customer Response Center, 400 Côte-Vertu Road West, Dorval, Québec H4S 1Y9, Canada; phone 514–855–2999; email [ac.yul@aero.bombardier.com](mailto:ac.yul@aero.bombardier.com); website [bombardier.com](https://www.bombardier.com).

- You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 2200 South 216th St., Des Moines, WA. For information on the availability of this material at the FAA, call 206–231–3195. It is also available at [regulations.gov](https://www.regulations.gov) under Docket No. FAA–2024–0467.

**FOR FURTHER INFORMATION CONTACT:**

Steven Dzierzynski, Aviation Safety Engineer, FAA, 1600 Stewart Avenue, Suite 410, Westbury, NY 11590; phone: 516–228–7300; email: [9-avs-nyaco-cos@faa.gov](mailto:9-avs-nyaco-cos@faa.gov).

**SUPPLEMENTARY INFORMATION:**

**Background**

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain Bombardier, Inc., Model CL–600–2B16 (604 Variant) airplanes. The NPRM published in the **Federal Register** on March 21, 2024 (89 FR 20141). The NPRM was prompted by AD CF–2023–55, dated July 18, 2023, issued by Transport Canada, which is the aviation authority for Canada (referred to after this as the MCAI). The MCAI states that during airplane refueling, a spark was seen when the fuel cap chain contacted one of the fuel scupper bolts. An inspection was performed and one of the fourteen bolts that surround the fuel inlet was found touching an electrical wire behind the scupper. Due to vibrations during flight, the bolt damaged the wire insulation and when the bolt was grounded to the airframe a spark was generated.

In the NPRM, the FAA proposed to require inspecting the electrical wires attached to the airplane connector located behind the fuel scupper for damage, and all applicable related investigative and corrective actions. The FAA is issuing this AD to address